

Learning Styles – an Overview

Introduction

“Learning Styles” has been regarded as one of the most important factors that control the way people learn. There is also a propensity to match students’ learning styles to the “teaching styles” of concerned teachers. In the realm of instructional design, the emphasis has gradually shifted towards achieving a match between the way learning resource materials are presented and the learning styles of the learners themselves. There is a strong tendency for teachers and course designers to pay closer attention to students’ learning styles – by diagnosing them, encouraging students to reflect on them and by designing teaching and learning interventions around them.

In face to face classrooms, evidence for the idea that students have individual learning styles appears to be offered when teachers notice that students vary enormously in the speed and manner with which they pick up new information and ideas, and the confidence with which they process and use them.

In the domain of “lifelong learning” students might become more motivated to learn by knowing more about their own strengths and weaknesses as learners. In turn, if teachers can respond to individuals’ strengths and weaknesses, then retention and achievement rates in formal programmes are likely to rise and ‘learning to learn’ skills may provide a foundation for lifelong learning.

Theoretical and empirical research on learning styles in the UK, the US and Western Europe began in the early years of the 20th century and is still producing ideas and an ever-proliferating number of instruments.

Some theories emphasise the dependence of learning styles on brain functioning, where claims are made that specific neural activity related to learning can be identified in different areas of the brain. Other theories focus on psychological aspects, such as personality *traits*, intellectual abilities and fixed traits which are said to form learning styles. From this latter perspective, it is claimed that learning styles can be defined accurately and then measured reliably and validly through psychological tests in order to predict behaviour and achievement.

There is also a great variability in the degree of stability between theories. Some theories represent learning styles as ‘flexibly stable’, arguing that previous learning experiences and other environmental factors may create preferences, approaches or strategies rather than styles. Learning styles as “fixed traits” imply that a valid and reliable measure is a sound basis for diagnosing individuals’ learning needs and then designing specific interventions to address them, both at the level of individual self-awareness and teacher activity. The downside is that it could lead to labelling and the implicit belief that traits cannot be altered. It may also promote a narrow view of ‘matching’ teaching and learning styles that could be limiting rather than liberating.

In order to counter such problems, some theorists promote the idea that learning styles could vary from task to task and learners should develop a repertoire of styles, so that an awareness of their own preferences and abilities should not bar them from working to acquire those styles which they do not yet possess.

Biological basis of Learning Styles

Genetic and other constitutionally based factors

Theorists supporting this trend claim or assume that styles are fixed, or are very difficult to change. They refer to genetically influenced personality traits, or to the dominance of certain functions linked with the left or right halves of the brain. For example, Rita Dunn argues that learning style is a 'biologically and developmentally imposed set of characteristics that make the same teaching method wonderful for some and terrible for others' (Dunn and Griggs 1998, 3). Her belief that the possibility of changing each individual's ability is limited, results in emphasis on 'matching' as an instructional technique. She believes that 'three-fifths of style is biologically imposed' (1990b, 15). She differentiates between environmental and physical elements as more fixed, and the emotional and 'sociological' factors as more open to change.

However, no studies of learning styles in identical and non-identical twins have been carried out, and there are no DNA studies in which learning style genes have been identified. Moreover, Learning environments have a considerable influence on the development of cognitive skills and abilities. There are no cognitive characteristics or personal qualities which are so strongly determined by the genes.

It also needs to be kept in mind that it has not been proved that matching instruction to individual sensory or perceptual strengths and weaknesses is more effective than designing instruction to include, for all learners, content-appropriate forms of presentation and response, which may or may not be multi-sensory. Indeed, Constantinidou and Baker (2002) found that pictorial presentation was advantageous for all adults tested in a simple item-recall task, irrespective of a high or low learning-style preference for imagery, and was especially advantageous for those with a strong preference for verbal processing. Therefore there is little evidence towards establishing "learning styles" as a "Physiological state".

The importance of physiological basis of "learning styles" however is often resorted to by various later theorists, although they did not consider them to be "fixed for life". For example, Kolb (1999) claims that *concrete experience* and *abstract conceptualisation* reflect right- and left-brain thinking respectively. Entwistle (1998) says the same about (holist) *comprehension* learning and (serialist) *operation* learning, as do Allinson and Hayes (1996) about their *intuition-analysis* dimension.

The belief of these theorists in the importance of genetic and other constitutional influences on learning and behavior does not mean that social, educational and other environmental influences count for nothing. Even for the Dunns, about 40% of the factors influencing learning styles are not biological.

Gregorc's Learning Styles

Gregorc's two dimensions are :

- '**perception**' - 'the means by which you grasp information' and
- '**ordering**' - 'the ways in which you authoritatively arrange, systematize, reference and dispose of information'(as defined by Gregorc 1982b, 5)

'Perception' may be 'concrete' or 'abstract' and 'ordering' may be 'sequential' or 'random'. These dimensions bear a strong resemblance to the Piagetian concepts of '*accommodation*' and '*assimilation*', which Kolb also adopted and called 'prehension' and 'transformation'. There is also a strong family resemblance between Gregorc's 'sequential processing' and Guilford's (1967) '*convergent thinking*', and between Gregorc's 'random processing' and Guilford's '*divergent thinking*'

Gregorc's (Gregorc 1982a).four styles :

- The **concrete sequential** (CS) learner is ordered, perfection-oriented, practical and thorough.
- The **abstract sequential** (AS) learner is logical, analytical, rational and evaluative.
- The **abstract random** (AR) learner is sensitive, colourful, emotional and spontaneous.
- The **concrete random learner** (CR) is intuitive, independent, impulsive and original.

Everyone can make use of all four channels, but according to Gregorc (2002) there are inborn (God-given) inclinations towards one or two of them. However, he also maintains that to try to act against stylistic inclinations puts one at risk of becoming false or inauthentic.

He contends that strong correlations exist between the individual's disposition, the media, and teaching strategies. Individuals with clear-cut dispositions toward concrete and sequential reality chose approaches such as ditto sheets, workbooks, computer-assisted instruction, and kits. Individuals with strong abstract and random dispositions opted for television, movies, and group discussion. Individuals with dominant abstract and sequential leanings preferred lectures, audio tapes, and extensive reading assignments. Those with concrete and random dispositions were drawn to independent study, games, and simulations. Individuals who demonstrated strength in multiple dispositions selected multiple forms of media and classroom approaches. It must be noted, however, that despite strong preferences, most individuals in the sample indicated a desire for a variety of approaches in order to avoid boredom.

Gregorc believes that students suffer if there is a lack of alignment between their adaptive abilities (styles) and the demands placed on them by teaching methods and styles.

According to this theory, a majority of students show a clear preference for a single cognitive style, a sequential processing preference (CS and AS) was significantly associated with a preference for structured learning, structured assessment activities and independent laboratory work. Random processing (CR and AR) students preferred group discussion and projects and assessments based on performance and presentation.

There was a clear tendency for science majors to be sequential processors and for humanities majors to be random processors, while social science majors were more evenly balanced.

Table 1
Gregorc's Mind Styles
Model and Style
Delineator (GSD)

	Strengths	Weaknesses
General	The GSD taps into the unconscious 'mediation abilities' of ' <i>perception</i> ' and 'ordering'.	Styles are natural abilities and not amenable to change.
Design of the model	<ul style="list-style-type: none"> ■ There are two dimensions: concrete-abstract and sequential-random. ■ Individuals tend to be strong in one or two of the four categories: concrete sequential, concrete random, abstract sequential and abstract random. 	<ul style="list-style-type: none"> ■ Some of the words used in the instrument are unclear or may be unfamiliar. ■ No normative data is reported, and detailed descriptions of the style characteristics are unvalidated.
Reliability	The author reports high levels of internal consistency and test-retest reliability.	Independent studies of reliability raise serious doubts about the GSD's psychometric properties.
Validity	Moderate <i>correlations</i> are reported for criterion-related validity.	<ul style="list-style-type: none"> ■ There is no empirical evidence for construct validity other than the fact that the 40 words were chosen by 60 adults as being expressive of the four styles. ■ The sequential/random dimension stands up rather better to empirical investigation than the concrete/abstract dimension.
Implications for pedagogy	Although Gregorc contends that clear-cut Mind Style dispositions are linked with preferences for certain instructional media and teaching strategies, he acknowledges that most people prefer instructional variety.	Gregorc makes the unsubstantiated claim that learners who ignore or work against their style may harm themselves.
Evidence of pedagogical impact	Results on study preference are mixed, though there is evidence that choice of subject is aligned with Mind Style and that success in science, engineering and mathematics is correlated with sequential style.	We have not found any published evidence addressing the benefits of self-knowledge of learning styles or the alignment of Gregorc-type learning and teaching styles.
Overall assessment	Theoretically and psychometrically flawed. Not suitable for the assessment of individuals.	
Key source	Gregorc 1985	

The Dunn and Dunn model

According to the Dunn and Dunn model, 'learning style is divided into 5 major strands called *stimuli*.

These are:

- a) **environmental strand** - incorporating individuals' preferences for the elements of sound, light, temperature, and furniture or seating design.
- b) **emotional strand** – which focuses on students' levels of motivation, persistence, responsibility, and need for structure
- c) **sociological strand** – that addresses students' preference for learning alone, in pairs, with peers, as part of a team, with either authoritative or collegial instructors.
- d) **psychological strand** – that incorporates the information-processing elements of global versus analytic and impulsive versus reflective behaviours, and
- e) **physiological strand** – that examines perceptual strengths (visual, auditory, kinaesthetic or tactile), time-of-day energy levels, and the need for intake (food and drink) and mobility while learning.

Teachers need to adapt instruction and environmental conditions by allowing learners to work according to their strong preferences and to avoid, as far as possible, activities for which learners report having very low preferences. People who have no high or low preferences do not need 'matching' and can therefore adapt more easily to different teaching styles and activities. Thus, anyone can improve their achievement and motivation if teachers match preferences with individualised instruction and changes to environment, food and drink intake, time-of-day activities and opportunities to work alone or with others.

Later research however also showed that instead of modality-based teaching, incorporation of specific instructional strategies could benefit all students. (Miller *et al.* 2000/01), found that a teaching strategy based on a 'programmed learning sequence' and designed to favour visually- and tactilely-oriented students increased attainment for all students in the experimental group. Variance was also found in learning style preferences among males and females in different countries (Hlawaty and Honigsfeld 2002), with girls showing stronger preferences in motivation, responsibility and working with others than boys, and boys showing stronger preferences for kinaesthetic learning.

Analytic/global and reflective/impulsive processing:

Analytics learn more easily when information is presented step by step in a cumulative sequential pattern that builds towards a conceptual understanding ... many analytics tend to prefer learning in a quiet, well-illuminated, informal setting: they often have a strong emotional need to complete the task they are working on, and they rarely eat, drink, smoke or chew, or bite on objects while learning.(Dunn et al. 1990, 226)

According to Rita Dunn (2003b, 2; original emphasis): the majority of students at all academic levels are global rather than analytic, they respond better to information taught globally than they do to information taught analytically. ... Integrated processors can internalise new and difficult data either globally or analytically but retain it only when they are interested in what they are learning

The main points of this theory is as follows :

- Individuals' learning style preferences differ significantly from each other and can be measured.
- The stronger the preference, the more important it is to provide compatible instructional strategies.
- interventions, environmental design and resources) results in increased academic achievement and
- Improved student attitudes toward learning.
- Most students can learn to capitalise on their learning style strengths when concentrating on new or difficult academic material.

Problems :

The model is based on the idea that preferences are relatively fixed and, in the case of some elements, constitutionally based. This could lead to labelling and generalising

Inspite of claims for the benefits of 'matching', it is not clear whether matching is desirable in subjects where learners need to develop new or complex preferences or different types of learning style altogether. Matching could also discourage teachers from challenging learners to work differently and to remedy weaknesses.

Finally, a doubt remains as to how far objective measurement is possible when many learners have limited self-awareness of their behavior and attitudes in learning situations.

The cognitive structure family

According to this view, learning styles are linked to particular personality features and are therefore, deeply embedded in personality structure.

cognitive structures intervene between drives and environmental demands. It is because cognitive structures are conceived to have a steering and modulating function in respect to both drives and situational requirements that Klein has given them the designation of 'cognitive control principles'.

Witkin's bipolar dimensions of field dependence/field independence is one of the most important theories in this area. However, the educational implications of field dependence/independence (FDI) have been explored mainly in the curriculum areas of second-language acquisition, mathematics, natural and social sciences as also in the understanding of individual differences in motor skills performance (Brady 1995) and musical discrimination. Three tests are used to study FD and FI: the Rod and Frame Test, the Body Adjustment Test and the Group Embedded Figures Test. The authors claim that results from the three tests are highly correlated with each other (Witkin and Goodenough 1981).

According to Witkin and Goodenough (1981), field independents are better than field dependents at tasks requiring the breaking up of an organized stimulus context into individual elements and/or the re-arranging of the individual elements to form a different organisation.'

Messick (1984, 63) argues that measurements of field independence and field dependence are too dependent on ability: 'by linking global style to low analytical performance, field dependence is essentially measured by default.' They function less autonomously.

Field independence has more (ie 10) significant correlations [ranging from 0.15 to 0.34] with abilities and aptitudes than any other style'. They can organise and structure the world by themselves, don't need external references

However, Guilford argues that one needs to differentiate between style and ability: Guilford (1980, 716) makes the point that 'Abilities are unipolar traits while styles are bipolar. Abilities are narrower in scope. Abilities are measured in terms of *level* of performance, where styles are measured by degree of some *manner* of performance.'

Theorists within this school of thought tend to believe that cognitive styles are not particularly amenable to change, since the idea of cognitive structure implies deep-seated and relatively fixed traits. The obvious implications for pedagogy, therefore, concern issues of diagnosis and 'matching'. However, Saracho (1998b, 288) warns of the dangers of matching FD students with 'socially oriented learning tasks' and FI students with 'abstract and less social assignments' – which might deny them the opportunity to learn the broad range of intellectual skills they need to function in society.

To distinguish between cognitive style and learning strategy, Riding and Cheema (1991, 195–196) claim that: ‘Strategies may vary from time to time, and may be learned and developed. Styles, by contrast are static and are relatively in-built features of the individual.’

Stable Personality Type

Jackson’s Learning Styles Profiler (LSP)

Jackson considers learning styles to be a sub-set of personality and also have a biological basis.(2002, 12). Four learning styles are proposed.

They are: initiator, reasoner, analyst and implementer.

- The initiator style is thought to be linked with Gray’s (1982) Behavioural Activation System (BAS), which
 - initiates approach behaviour when there is a chance of reward
- The reasoner style is thought to have a basis in Gray’s Behavioural Inhibition System (BIS), which inhibits behaviour in response to cues associated with punishment.
- Following Cloninger (1993), the analyst style is seen as a self-regulatory, goal-oriented tendency which serves to maintain interest in a problem so that it can be thoroughly understood.
- The implementer style is seen as a logically necessary addition if plans are to be carried out. No neuropsychological basis is claimed for the implementer style.

Jackson’s learning styles are most useful selection and appraisals in organisational contexts. It is also very effective in designing computer-generated recommendations for personal development.

Jackson sees some learning styles, behaviours and strategies as being more easily modified than others. According to 131 raters, the analyst style is the most conscious in origin, which accords with its theoretical status as self-regulatory, goal-oriented and ‘interest maintaining’. The raters thought that the initiator style is the most instinctive in origin, which suggests that impulsive, pleasure-seeking behaviour is the most difficult to change. Overall, Jackson takes the view that for both individuals and organisations, it is desirable to build up multiple strengths, rather than encouraging people to work only in ways which come most naturally to them.

Table 16
Key characteristics
of each style

Initiator (sensation seeking, impulsive, extroverted)
Does not usually think carefully before doing anything
Generally does and says things without stopping to think
Mostly speaks before thinking things out
Considers all the advantages and disadvantages before making up his/her mind
Reasoner (intellectual, rational, objective, has 'theory of mind')
Rarely gets the feeling that it is useless trying to get anywhere in life
Rarely feels that he/she doesn't have enough control over the direction his/her life is taking
Rarely feels that he/she has little influence over the things that happen to him/her
Rarely finds life difficult to cope with
Analyst (introverted, responsible, cautious, wise, methodological, insightful)
Does not have a tendency to be inconsistent and untidy in his/her work
Rarely leaves things to the last minute
Does not have a tendency to 'let things slide'
Can always be fully relied upon
Implementer (expedient, realistic, practical)
Rarely philosophises about the purpose of human existence
Is not overcome by a sense of wonder when he/she visits historical monuments
Rarely discusses the causes and possible solutions of social and political problems with friends
Rarely pauses just to meditate about things in general

Table 17
Strengths and
weaknesses of the
different preferences

	Strengths	Weaknesses
Initiator	<ul style="list-style-type: none"> Engages problem Centre of attention Makes it happen 	<ul style="list-style-type: none"> Leaps without looking Focuses on self too much at too little Can make mistakes
Reasoner	<ul style="list-style-type: none"> Inhibits further initiation behaviour to increase understanding Identifies why things happen Provides a model Autonomous, self-reliant Independent Insightful 	<ul style="list-style-type: none"> More interested in theory than practice Doesn't understand realistic problem
Analyst	<ul style="list-style-type: none"> Knows all about the issues Great source of information Sees the pros and cons Wise, responsible and conscientious Maintains behaviour; insight learning 	<ul style="list-style-type: none"> Can't see the wood for the trees Doesn't get started Procrastinates
Implementer	<ul style="list-style-type: none"> Understands the realities Very practical Down to earth 	<ul style="list-style-type: none"> Has little 'humanity' Not enough imagination

Table 18
The extent to which
corresponding scales –
Jackson (LSP) and
Honey and Mumford
(LSQ) – measure the
same constructs

Corresponding measures (LSP and LSQ)	Percentage of shared variance
Initiator and activist	14
Reasoner and theorist	2
Analyst and reflector	4
Implementer and pragmatist	0

Flexibly stable learning preferences

Kolb

For Kolb and for those who have followed in his tradition, a learning style is not a fixed trait, but 'a differential preference for learning, which changes slightly from situation to situation. At the same time, there is some long-term stability in learning style' (2000, 8). Kolb goes so far as to claim that the scores derived from the LSI are stable over very long periods. Kolb's four dominant learning styles – diverging, assimilating, converging and accommodating, each located in a different quadrant of the cycle of learning – have been enormously influential in education, medicine and management training.

Kolb (1999) claims that an appreciation of differing learning styles can help people to work more effectively in teams, resolve conflict, communicate at work and at home, and choose careers.

According to Kolb (1984, 41): 'learning is the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping experience and transforming it'. He proposes that experiential learning has six characteristic features.

1. Learning is best conceived as a process, not in terms of outcomes.
2. Learning is a continuous process grounded in experience.
3. Learning requires the resolution of conflicts between *dialectically* opposed modes of adaptation to the world.

For Kolb, learning is by its very nature full of tension, because new knowledge is constructed by learners choosing the particular type of abilities they need. Effective learners need four kinds of ability to learn:

- from concrete experiences (CE);
- from reflective observations (RO);
- from abstract conceptualizations (AC);
- from active experimentations (AE).

These four capacities are structures along two independent axes - with the concrete experiencing of events at one end of the first axis and abstract conceptualisation at the other. The second axis has active experimentation at one end and reflective observation at the other. Conflicts are resolved by choosing one of these adaptive modes, and over time, we develop preferred ways of choosing.

4. Learning is a holistic process of adaptation to the world.
5. Learning involves transactions between the person and the environment.
6. Learning is the process of creating knowledge: '[which] is the result of the transaction between social knowledge and personal knowledge' (1984, 36).

Kolb describes the process of experiential learning as a four-stage cycle. This involves the four adaptive learning modes mentioned above – CE, RO, AC and AE – and the transactions and the resolutions among them. The tension in the abstract-concrete dimension is between relying on conceptual interpretation (what Kolb calls ‘comprehension’) or on immediate experience (apprehension) in order to grasp hold of experience. The tension in the active-reflective dimension is between relying on internal reflection (intention) or external manipulation (extension) in order to transform experience.

It is out of this structure that Kolb defines four different types of knowledge and four corresponding learning styles. He explains the process (1984, 76–77) as follows:

“As a result of our hereditary equipment, our particular past life experience, and the demands of our present environment, most people develop learning styles that emphasise some learning abilities over others. Through socialisation experiences in family, school and work, we come to resolve the conflicts between being active and reflective and between being immediate and analytical in characteristic ways, thus leading to reliance on one of the four basic forms of knowing: divergence, achieved by reliance on apprehension transformed by intention; assimilation, achieved by comprehension transformed by intention; convergence, achieved through extensive transformation of comprehension; and accommodation, achieved through extensive transformation of apprehension”.

The main characteristics of the four styles are summarised below:

Type 1: the converging style (abstract, active)

relies primarily on abstract conceptualisation and active experimentation; is good at problem solving, decision making and the practical application of ideas; does best in situations like conventional intelligence tests; is controlled in the expression of emotion and prefers dealing with technical problems rather than interpersonal issues. A characteristic question of this learning type is *“How?”* These learners respond to having opportunities to work actively on well-defined tasks and to learn by trial-and-error in an environment that allows them to fail safely. To be effective, the instructor should function as a *coach*, providing guided practice and feedback.

Type 2: the diverging style (concrete, reflective)

emphasises concrete experience and reflective observation; is imaginative and aware of meanings and values; views concrete situations from many perspectives; adapts by observation rather than by action; interested in people and tends to be feeling-oriented. A characteristic question of this learning type is *“Why?”* These learners respond well to explanations of how course material relates to their experience, their interests, and their future careers. To be effective with Type 1 students, the instructor should function as a *motivator*.

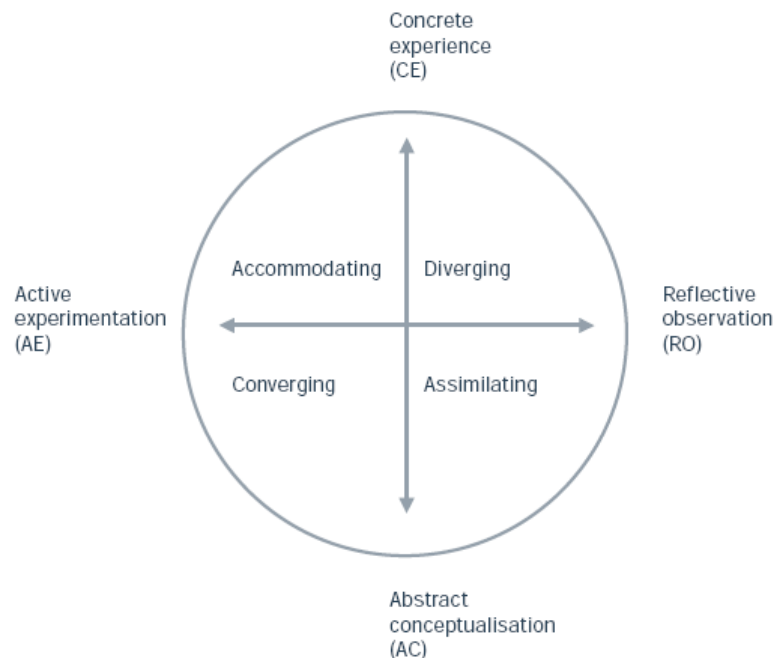
Type 3: the assimilating style (abstract, reflective)

prefers abstract conceptualisation and reflective observation; likes to reason inductively and to create theoretical models; is more concerned with ideas and abstract concepts than with people; thinks it more important that ideas be logically sound than practical. A characteristic question of this learning type is "What?" These learners respond to information presented in an organized, logical fashion and benefit if they have time for reflection. To be effective, the instructor should function as an *expert*.

Type 4: the accommodating style (concrete, active)

emphasises concrete experience and active experimentation; likes doing things, carrying out plans and getting involved in new experiences; good at adapting to changing circumstances; solves problems in an intuitive, trial-and-error manner; at ease with people but sometimes seen as impatient and 'pushy'. For more information on the strengths and weaknesses of each style, see Jonassen and Grabowski (1993). A characteristic question of this learning type is "What if?" These learners like applying course material in new situations to solve real problems. To be effective, the instructor should stay out of the way, maximizing opportunities for the students to discover things for themselves.

Figure 9
Kolb's four learning styles



'Learning styles represent preferences for one mode of adaptation over the others; but these preferences do not operate to the exclusion of other adaptive modes and will vary from time to time and situation to situation'.

Kolb argues that his theory of experiential learning provides a useful framework for the design and management of all learning experiences and, moreover, he makes three practical suggestions.

Kolb's **first** practical suggestion is that teachers and learners should explicitly share their respective theories of learning, a process which would create four benefits. Students would understand why the subject matter is taught as it is and what changes they would need to make to their learning styles to study this subject. Teachers would identify the range of learning styles among the student body and would modify their teaching accordingly.

Both teachers and students would be 'stimulated to examine and refine their learning theories' (Kolb 1984, 202).

The need to individualise instruction is the **second** practical conclusion that Kolb draws from his research into learning environments. This is, of course, easier said than done, particularly in further education with large group sizes and a modular curriculum, but Kolb believes that information technology (IT) will provide the breakthrough, together with a shift in the teacher's role from 'dispenser of information to coach or manager of the learning process' (1984, 202). Kolb's *Facilitator's guide to learning* presents a table which 'summarizes' learning.

Finally, Kolb is concerned about the growing specialisation in US higher education and does not want students to be equipped only with the learning styles appropriate for particular careers. Instead, he argues for 'integrative development', where students become highly competent in all four learning modes: active, reflective, abstract and concrete.

To reach all types of learners, a professor should explain the relevance of each new topic, present the basic information and methods associated with the topic, provide opportunities for practice in the methods, and encourage exploration of applications. The term "teaching around the cycle" was originally coined to describe this instructional approach.

Honey and Mumford

Based on Kolb's theory, they devised a questionnaire which probes general behavioural tendencies rather than learning. So instead of asking people directly how they learn, as Kolb's LSI does – something which most people have never consciously considered – Honey and Mumford give them a questionnaire which probes general behavioural tendencies rather than learning.

The links with Kolb's work remain strong, however, because the four learning styles are connected to a revised version of Kolb's experiential learning cycle. So, for example, activists are said to have a predilection for experiencing; reflectors for reviewing experiences or mulling over data; theorists for drawing conclusions; and pragmatists for planning the next steps. Honey and Mumford's intention is that learners should become proficient in all four stages of the learning cycle.

Honey and Mumford (1992, 1) define a learning style as being 'a description of the attitudes and behavior which determine an individual's preferred way of learning'. The four learning styles are described as those of **activists, reflectors, theorists and pragmatists**. No single style has an overwhelming advantage over any other. Each has strengths and weaknesses but the strengths may be especially important in one situation, but not in another'.

Learning Styles constitute only one factor in a range of influences which include past experiences of learning, the range of opportunities available, the culture and climate for learning and the impact of the trainer/teacher, among many other factors.

Learning styles 'are modifiable at will' – for example, to strengthen an underdeveloped style; or 'by a change of circumstances' (Honey and Mumford 2000, 19) – for example, a change of job to a firm with a different learning culture.

It is admitted that 'self-perceptions can be misleading [and that] the answers are easy to fake if someone is determined to give a misleading impression' (Honey and Mumford 2000, 20). The latter is considered less likely if people have been assured that the LSQ is a tool for personal development.

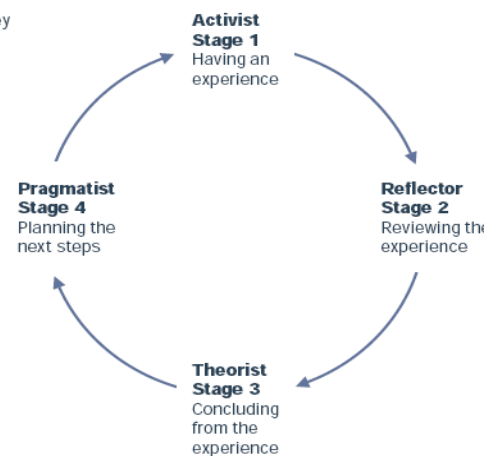
Table 21
Strengths and weaknesses
Source: Honey and Mumford (2000)

Style	Strengths	Weaknesses
Activists	<ul style="list-style-type: none"> ■ Flexible and open-minded ■ Ready to take action ■ Like to be exposed to new situations ■ Optimistic about anything new and therefore unlikely to resist change 	<ul style="list-style-type: none"> ■ Tendency to take the immediately obvious action without thinking through possible consequences ■ Often take unnecessary risks ■ Tendency to do too much themselves and to hog the limelight ■ Rush into action without sufficient preparation ■ Get bored with implementation/consolidation/follow through
Reflectors	<ul style="list-style-type: none"> ■ Careful ■ Thorough and methodical ■ Thoughtful ■ Good at listening to others and assimilating information ■ Rarely jump to conclusions 	<ul style="list-style-type: none"> ■ Tendency to hold back from direct participation ■ Slow to make up their minds and reach a decision ■ Tendency to be too cautious and not take enough risks ■ Not assertive; not particularly forthcoming and have no 'small talk'
Theorists	<ul style="list-style-type: none"> ■ Logical, 'vertical' thinkers ■ Rational and objective ■ Good at asking probing questions ■ Disciplined approach ■ Grasp of the 'big picture' 	<ul style="list-style-type: none"> ■ Restricted in lateral thinking ■ Low tolerance for uncertainty, disorder and ambiguity ■ Intolerant of anything subjective or intuitive ■ Full of 'shoulds, oughts and musts'
Pragmatists	<ul style="list-style-type: none"> ■ Eager to test things out in practice ■ Practical, down to earth, realistic ■ Businesslike – get straight to the point ■ Technique-oriented 	<ul style="list-style-type: none"> ■ Tendency to reject anything without an obvious application ■ Not very interested in theory or basic principles ■ Tendency to seize on the first expedient solution to a problem ■ Impatient with indecision ■ More task-oriented than people-oriented

Table 22
LSQ retest correlations,
by learning style

Style	
Theorists	
Reflectors	0.95
Pragmatists	0.92
Activists	0.87
	0.81

Figure 11
Dimensions of Honey and Mumford's learning cycle
Source: Honey and Mumford (2000)



Honey (2002c) summed up as follows: 'The LSQ is therefore merely a starting point, a way to get people who haven't thought about how they learn to give it some consideration and to realise, often for the first time, that learning is learnable'

List of activities which match each of the four learning styles,

Activists react positively to:	<ul style="list-style-type: none"> ■ Action learning ■ Business game simulations 	<ul style="list-style-type: none"> ■ Job rotation ■ Discussion in small groups 	<ul style="list-style-type: none"> ■ Role playing ■ Training others ■ Outdoor activities
Reflectors react positively to:	<ul style="list-style-type: none"> ■ E-learning ■ Learning reviews 	<ul style="list-style-type: none"> ■ Listening to lectures or presentations ■ Observing role plays 	<ul style="list-style-type: none"> ■ Reading ■ Self-study/self-directed learning
Theorists react positively to:	<ul style="list-style-type: none"> ■ Analytical reviewing ■ Exercises with a right answer 	<ul style="list-style-type: none"> ■ Listening to lectures ■ Self-study/self-directed learning 	<ul style="list-style-type: none"> ■ Solo exercises ■ Watching 'talking head' videos
Pragmatists react positively to:	<ul style="list-style-type: none"> ■ Action learning ■ Discussion about work problems in the organisation 	<ul style="list-style-type: none"> ■ Discussion in small groups ■ Problem-solving workshops 	<ul style="list-style-type: none"> ■ Group work with tasks where learning is applied ■ Project work

Allinson and Hayes' Cognitive Style Index (CSI)

Allinson and Hayes see *intuition-analysis* as the most fundamental dimension of cognitive style.

Intuition, characteristic of right-brain orientation, refers to immediate judgment based on feeling and the adoption of a global perspective. Analysis, characteristic of left-brain orientation, refers to judgment based on mental reasoning and a focus on detail.

They follow Mintzberg (1976) in linking right-brained intuition with the need of managers to make quick decisions on the basis of 'soft' information, while left-brained analysis is seen as the kind of rational information processing that makes for good planning (Hayes and Allinson 1997).

A left-brain oriented person 'tends to be compliant, prefers structure and is most effective when handling problems that require a step-by-step solution', while a right-brain oriented person 'tends to be non-conformist, prefers open-ended tasks and works best on problems favouring a holistic approach' (Allinson and Hayes 2000, 161).

They accept Tennant's (1988, page 89) definition of cognitive style as 'an individual's characteristic and consistent approach to organizing and processing information', Allinson and Hayes readily admit that cognitive style can be shaped by culture, altered by experience and overridden for particular purposes. But their starting position seems to be that the cognitive style concept may prove useful in work settings, not so much because styles can be modified, but rather through fitting people to jobs and, where economically feasible, adjusting job demands to what best suits the individual.

Analysis type	<ul style="list-style-type: none"> ■ I find detailed, methodological work satisfying. ■ I am careful to follow rules and regulations at work. ■ When making a decision, I take my time and thoroughly consider all relevant factors. ■ My philosophy is that it is better to be safe than risk being sorry.
Intuition	<ul style="list-style-type: none"> ■ I make decisions and get on with things rather than analyse every last detail. ■ I find that 'too much analysis results in paralysis'. ■ My 'gut feeling' is just as good a basis for decision making as careful analysis. ■ I make many of my decisions on the basis of intuition.

Allinson and Hayes (1996) predicted that intuition rather than analysis would be more strongly associated with seniority in business organisations. They found that within two companies (construction and brewing), senior managers and directors came out as significantly more intuitive than lower-level managers and supervisors.

Learning Approaches & Strategies

Entwistle

During the 1970s, a body of research on learning explored a holistic, active view of *approaches* and *strategies* – as opposed to *styles* – that takes into account the effects of previous experiences and contextual influences. This emphasis encourages a broad approach to pedagogy that encompasses subject discipline, institutional culture, students' previous experience and the way the curriculum is organised and assessed.

In **Entwistle's** model, for example, a strategy describes the way in which students choose to deal with a specific learning task. It is therefore less fixed than a style, which is a broader characterization of how students prefer to tackle learning tasks generally. Researchers within this family refer to underlying personality differences and relatively fixed cognitive characteristics. This leads them to differentiate between styles, strategies and approaches, with the latter being derived from perceptions of a task and cognitive strategies that learners might then adopt to tackle it.

In Entwistle's work, the learner's intentions and goals determine four distinct *educational orientations*:
academic, vocational, personal and social.

These orientations relate to *extrinsic and intrinsic motivation* and while discernible, these different types of motivation fluctuate throughout a degree course. Students hold *conceptions of learning* that tend to become increasingly sophisticated as they progress through a degree course; for example, unsophisticated students may see learning as increasing knowledge or acquiring facts, while more sophisticated students recognise that learning requires the abstraction of meaning and that understanding reality is based on interpretation (Entwistle 1990).

Students' orientations to, and conceptions of, learning and the nature of knowledge both lead to and are affected by students' typical *approaches to learning*. Students' conceptions of learning are said to develop over time. Entwistle (1998) draws directly on Perry to argue that students' *conceptions of learning* are linked to their progress through these stages of thinking about knowledge and evidence.

Drawing on Marton and Säljö's ideas about *deep* and *surface* learning (1976), Entwistle argues that if students have a sophisticated conception of learning and a rich understanding of the nature of knowledge and evidence, they adopt a *deep* approach in order to reach their own understanding of material and ideas. If, on the other hand, they see learning as memorising or acquiring facts, and their intention is merely to meet course requirements or to respond to external injunctions, they are likely to adopt a *surface approach*.

However, students do not only adopt deep and surface approaches. The structure of a curriculum and the demands of *summative assessment* exert a strong influence on approaches to learning. Entwistle argues that summative assessment in higher education usually encourages a *strategic approach* where students combine deep and surface approaches in order to achieve the best possible marks.

Strategy is defined (Entwistle, Hanley and Hounsell 1979, 368; original emphasis) as the way 'a student *chooses* to deal with a specific learning task in the light of its perceived demands' and style 'as a broader characterisation of a student's *preferred* way of tackling learning tasks generally.

An influential researcher within this field has been **Pask** (1976) who argues that there are identifiable differences between students' strategies, so that some learners adopt :

- a ***holist strategy*** and aim from the outset to build up a broad view of the task, and to relate it to other topics and to real-life and personal experience. Holists (wholists) tended to form more complex hypotheses relating to more than one characteristic at a time.
- The opposite strategy is a ***serialist*** one, where students attempt to build their understanding from the details of activities, facts and experimental results instead of making theoretical connections. Serialists (partists) followed a step-by-step learning procedure, concentrating on narrow, simple hypotheses relating to one characteristic at a time

In his later work, **Pask** reinforced the distinction between strategies and styles and identified two extreme and therefore incomplete styles:
comprehension and operation learning.

Comprehension learners tend to:

- pick up readily an overall picture of the subject matter (eg relationships between discrete classes)
recognise easily where to gain information build descriptions of topics and describe the relations between topics.

Operation learners tend to:

- pick up rules, methods and details, but are not aware of how or why they fit together
- have a sparse mental picture of the material be guided by arbitrary number schemes or accidental features of the presentation
- use specific, externally-offered descriptions to assimilate procedures and to build concepts for isolated topics.

Some learners use both types of strategy in a 'versatile' approach.

Learning approaches and strategies

Another crucial influence in this family is the work of **Marton and Säljö** who identified (1976, 7–8) two different levels of processing in terms of the learning material on which students' attention is focused:

*in the case of **surface-level processing**, the student directs his (sic) attention towards learning the test itself (the sign), ie., he has a reproductive conception of learning which means he is more or less forced to keep to a rote-learning strategy. In the case of **deep-level processing**, on the other hand, the student is directed towards the intentional content of the learning material (what is signified), ie. he is directed towards comprehending what the author wants to say, for instance, a certain scientific problem or principle.*

Although it is possible to present a clear theoretical case that certain approaches affect learning outcomes, unexpected or idiosyncratic contextual factors may disrupt this theoretical association.

According to **Ramsden** (1983), empirical study of different contexts of learning highlights the effects of individuals' decisions and previous experiences on their approaches and strategies. In terms of pedagogy, 'students who are aware of their own learning strategies and the variety of strategies available to them, and who are skilled at making the right choices, can be said to be responding intelligently or metacognitively in that context' (1983, 178).

Table 32

Defining features of approaches to learning and studying

Source:
Entwistle, McCune
and Walker (2001)

Deep approach

Intention – to understand ideas for yourself

- Relating ideas to previous knowledge and experience
- Looking for patterns and underlying principles
- Checking evidence and relating it to conclusions
- Examining logic and argument cautiously and critically
- Being aware of understanding developing while learning
- Becoming actively interested in the course content

Seeking meaning

By:

Surface approach

Intention – to cope with course requirements

- Treating the course as unrelated bits of knowledge
- Memorising facts and carrying out procedures routinely
- Finding difficulty in making sense of new ideas presented
- Seeing little value or meaning in either courses or tasks set
- Studying without reflecting on either purpose or strategy
- Feeling undue pressure and worry about work

Reproducing

By:

Strategic approach

Intention – to achieve the highest possible grades

- Putting consistent effort into studying
- Managing time and effort effectively
- Finding the right conditions and materials for studying
- Monitoring the effectiveness of ways of studying
- Being alert to assessment requirements and criteria
- Gearing work to the perceived preferences of lecturers

Reflective organising

By:

In contrast to a belief in the relatively fixed nature of stylistic preferences, Entwistle, his colleagues and other supporters of the model argue that students, teachers and institutions can all change students' approaches to learning. Combining quantitative and qualitative methodology suggests that approaches to learning do not reflect inherent, fixed characteristics of individuals. Instead, Entwistle and his colleagues argue that approaches are responsive to the environment and to students' interpretations of that environment.

Entwistle also claims that teaching can affect approaches to learning. For example, Ramsden and Entwistle (1981) showed that a deep approach is encouraged by students being given freedom in learning and by experiencing good teaching, with good pace, pitch, real-life illustrations, empathy with students' difficulties, tutors being enthusiastic and offering 'lively and striking' explanations.

A surface approach is reinforced by the forms of summative assessment required in the course, a heavy workload and lecturers who foster dependency by 'spoon-feeding'.

Vermunt's framework for classifying learning styles

He defines learning style (1996, 29) as 'a coherent whole of learning activities that students usually employ, their learning orientation and their mental model of learning'. He adds that 'Learning style is not conceived of as an unchangeable personality attribute, but as the result of the temporal interplay between personal and contextual influences'.

This definition of learning style seeks to be flexible and integrative and, in comparison with earlier approaches, strongly emphasises metacognitive knowledge and self-regulation. It is concerned with both declarative and procedural knowledge, including self-knowledge. It deals not only with cognitive processing, but also with motivation, effort and feelings (and their regulation).

Vermunt's framework was not designed to apply in all post-16 learning contexts, but specifically to university students.

Within Vermunt's framework, four learning styles are defined:

- meaning-directed
- application-directed
- reproduction-directed and
- undirected.

Each is said (1996) to have distinguishing features in five areas:

- the way in which students cognitively process learning contents (what students do)
- the learning orientations of students (why they do it)
- the affective processes that occur during studying (how they feel about it)
- the mental learning models of students (how they see learning)
- the way in which students regulate their learning (how they plan and monitor learning).

However,

it should be noted that the framework is conceived as a flexible one. Vermunt does not claim that his learning styles are mutually exclusive.

Table 35
Vermunt's learning styles
with illustrations of their
components

Source:
Vermunt (1990)

	Meaning-directed	Application-directed	Reproduction-directed	Undirected
Cognitive processing	Look for relationships between key concepts/theories: build an overview	Relate topics to everyday experience: look for concrete examples and uses	Select main points to retain	Find study difficult; re- and re-read
Learning orientation	Self-improvement and enrichment	Vocational or 'real world' outcomes	Prove competence by getting good marks	Ambivalent; insecure
Affective processes	Intrinsic interest and pleasure	Interested in practical details	Put in time and effort; afraid of forgetting	Lack confidence; fear failure
Mental model of learning	Dialogue with experts stimulates thinking and engagement with subject through exchange of views	Learn in order to use knowledge	Look for structure in teaching and texts to help take in knowledge and pass examinations. Do not value critical processing or peer discussion	Want teachers to do more; seek peer support
Regulation of learning	Self-guided by interest and their own questions; diagnose and correct poor understanding	Think of problems and examples to test understanding, especially of abstract concepts	Use objectives to check understanding; self-test; rehearse	Not adaptive

Table 36
Areas and sub-scales
of the ILS

Area	Sub-scale
Cognitive processing	Deep processing: <ul style="list-style-type: none"> ■ relating and structuring ■ critical processing Stepwise processing: <ul style="list-style-type: none"> ■ memorising and rehearsing ■ analysing Concrete processing
Learning orientation	<ul style="list-style-type: none"> ■ Personally interested ■ Certificate-oriented ■ Self-test-oriented ■ Vocation-oriented ■ Ambivalent
Mental model of learning	<ul style="list-style-type: none"> ■ Construction of knowledge ■ Intake of knowledge ■ Use of knowledge ■ Stimulating education ■ Cooperative learning
Regulation of learning	Self-regulation: <ul style="list-style-type: none"> ■ learning process and results ■ learning content External regulation: <ul style="list-style-type: none"> ■ learning process ■ learning results Lack of regulation

Conclusion

The primary professional responsibility of teachers and trainers is to maximise the learning opportunities of their students or staff and that 'We should surely not leave effective study strategies to evolve through trial and error when we are now in a position to offer coherent advice'. Awareness and detection of one's learning styles and approaches learning styles and approaches could be used to encourage self-development, not only by diagnosing how people learn, but by showing them how to *enhance* their learning. It could enable learners to choose the most appropriate learning strategy from a wide range of options to fit the particular task in hand.

A discussion of learning styles may prove to be the catalyst for individual, organisational or even systemic change. Marzano (1998) found that approaches which were directed at the metacognitive level of setting goals, choosing appropriate strategies and monitoring progress are more effective in improving knowledge outcomes than those which simply aim to engage learners at the level of presenting information for understanding and use.

However, the complexity of the learning styles, vast array of different learning styles and the lack of an overarching synthesis of the main models, leads to the impression of a research area that has become fragmented.

Theorists also warn of the dangers of labelling, whereby teachers come to view their students as being a certain type of learner, sometimes even students tend to classify them and act accordingly. The temptation to classify, label and stereotype is clearly difficult to resist. Entwistle has repeatedly warned against describing students as 'deep' or 'surface' learners, but these warnings tend to be ignored when instruments move into mainstream use.

The research in the field of learning styles needs independent, critical, longitudinal and large-scale studies with experimental and control groups to test the claims for pedagogy made by the test developers.

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