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LEARNING STYLES FOR TEACHER RESEARCHERS

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Abstract: This paper provides an overview of some practicalities that teachers may need to know so as to enhance their learning style research for classroom teaching and learning. Some of the practicalities include the use of electronic data bases, knowledge on definitions, terminology, concepts, research trends, relationship to learning theories, evaluation of instruments, and the applicability of learning style to classroom teaching.

Objective of the paper

To identify the type of basic knowledge teachers need to acquire prior to their embarking on learning styles research in the schools.

Background

One of the main concerns of education has been on the individual differences of students. Researchers have focused their attention on different domains, namely IQ, creativity, and aptitude. Recent interests have been on learners' differences in terms of learning styles, cognitive styles, brain functioning, information processing, and a learner centered environment where learners' aptitudes, abilities, and learning modalities are given importance.

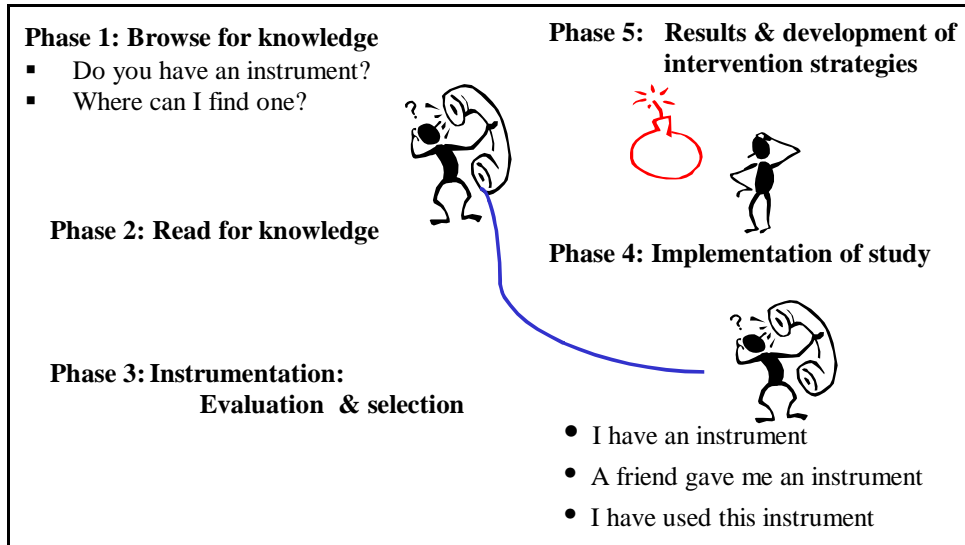
Learner analysis and objectives are forefront considerations in all instructional models. Together with curriculum and instruction, learner is one of the three important considerations in the learning process. All these constructs of individuality are crucial in determining the selection of appropriate teaching strategies and learning resources. The information technology age, the 'thinking school and learning nation' concept in Singapore revived and accelerated the popularity of learning styles, cognitive styles, brain functioning, and information processing.

Learning style differences or cognitive diversity is a non-threatening and non-traditional approach of individuality. Contrary to the traditional cognitive measurement by intelligence quotient (IQ), there exists a horizontal dimension which focuses on cognitive dominance, namely the learners' strengths, weaknesses, and preferences of information processing.

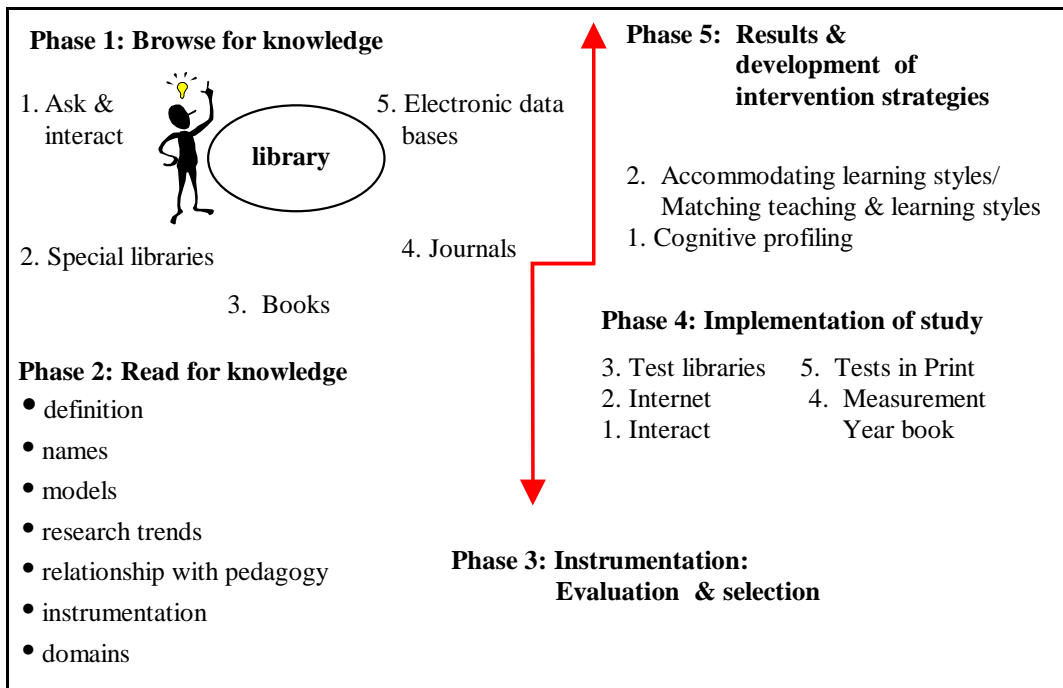
Scenarios of learning style research in schools

Scenario 1 is a typical scenario of conducting learning style research in the schools. Teacher researchers move directly from phase 1 (browse for knowledge), into 3 (instrumentation), and 4 (implementation of study). They skip phase 2 (read for knowledge). Then they get stuck at phase 5 (results and development of instructional strategies) as they do not know how to relate the data with learning styles. Instruments are selected based on convenience and not out of understanding or suitability as shown in phase 3.

Scenario 1: A scenario commonly practised in learning style research



Scenario 2: A recommended scenario for learning style research (Yeap’s model)



Scenario 2 is a recommended scenario for learning style research. Teacher researchers move systematically through the five phases to build up different forms of knowledge base. Phase 1 involves browsing for knowledge at the library; phase 2 is reading for knowledge; phase 3 is evaluating and selecting instruments through the use of references like Tests in Print; phase 4 is implementing studies like cognitive profiling etc; and phase 5 is to analyse the results, draw

conclusions, and to develop intervention strategies. There is a constant referral to phase 1 and 2 for more reading whenever there are doubts in phases 3, 4, and 5.

What is the basic knowledge on learning styles that teacher researchers should be competent in prior to the actual implementation of their research?

Basic knowledge on learning styles for teacher researchers:

‘The future belongs to countries whose people make the most productive use of information, knowledge and technology,’ and ... ‘these are now the key factors for economic success, not natural resources,’ (Goh, 1994, p. 3). A strong content loaded framework will enable teacher researchers to be in control over the information that allows them to deal with certain matters with more insight into new learning.

Prior to conducting learning style research, teacher researchers should have a mastery of the following basic knowledge. They should be able to do the following.

Locate resources and use electronic databases

‘How you gather, manage, and use information will determine whether you win or lose ... the underlying key to everything is, of course, the Internet. That has changed everything including Microsoft itself...’ (Gates & Hemingway, 1999). Knowing how to retrieve information from the libraries, internet, and electronic databases for more current and worldwide information sources is a must for teacher researchers who want to carry out learning style research. Nowadays, one needs the technology to cope with information explosion and to stay above the latest development of things. Technology has provided the speed, accuracy, flexibility, versatility, and the ease of retrieving information to cope with the over whelming and intricate mazes of huge amounts of global materials.

Individuals are prepared for lifelong learning if they know how knowledge is found, organised, and used. Information sources through the internet is available in most homes and places of work. Most institutions’ library network subscribes to electronic databases. Gone are the days where searches for materials are time consuming and tedious as the process involves plowing through thick and heavy volumes of indexes. Through the use of subject, author, or title entries, the information can be accessed from the comfort of your office or home. Electronic databases are one of the primary sources for research reports, working papers, journal articles, and dissertations related to your field of interest. Useful electronic databases that have abundant information on learning styles include the Current Index of Journal in Education (CIJE), Resources in Education (RIE), and the Dissertation Abstracts.

Realise the pedagogical importance of learning style

- Learning styles or cognitive styles are related to the psychology of different abilities and individual differences expounded in J. P. Guilford’s ‘faces of intellect’, Howard Gardner’s theory of ‘multiple intelligences’, and Robert Sternberg’s ‘triarchic theory of intelligence’ (Woolfolk, 1998). These three theories discuss separate primary mental abilities and how individuals differ in different abilities.
- Learner analysis together with objectives are foremost considerations in all the instructional design models. Together with ‘curriculum’ and ‘teacher’, learner analysis is one of the three important considerations in the learning process. Learner analysis is the process of seeking, and transmitting information about the learners for decision making. The analysis determines

instructional decisions pertaining to the selection of appropriate resources, and instructional intervention for optimal learning.

- An ageless question in education is: How do individuals learn, acquire knowledge, think, perceive, and process information? These unobservable mental activities are associated with the brain, the organ that manipulates these processes. Brain researchers yielded evidence to support brain asymmetry – the idea that the two sides of the normal brain are different naturally. Studies on what cognitive processes come into play as individuals try to make sense of complex situations are conducted through ‘cognitive profiling’.
- Cognitive profiling takes advantage of the anatomical organisation of the sensory and motor systems in order to ‘trick’ the brain into revealing the mode of operation to define patterns of cognitive functions (individuals’ consistently preferred modes of information gathering, storage, organisation, and use) unique to the individuals. Cognitive testing is gaining popularity in providing a qualitative picture of an individual’s strengths and weaknesses. It provides an outward display of how individuals think, reason, solve problems, draw conclusions, formulate concepts, and process information. Cognitive profiling research is to observe the subjects’ underlying patterns of cognitive processing as identified by their brain functioning performance in lateralisation tests.
- Learning styles, cognitive styles, and thinking are directly related. The common factor in thinking, learning styles, and cognitive styles is ‘information processing or meaning making’. In thinking, information processing is termed ‘operations’. In learning and cognitive styles, information processing is the psychological domain of learning.
- The ‘thinking schools and learning nation’ concept, and information technology in Singapore accelerated an interest in mental activities involving the organisation of thinking, brain functioning. The brain is the organ that manipulates thinking which has often been referred to as left, right, and whole brain functioning.
- Learning styles is related to ability driven education. It is also in line with Singapore’s strategic plan to create a learner centered school environment which allows for learning efficiency (as opposed to teaching efficiency) as it takes into account the aptitudes, abilities, and learning modalities of the learners. The assumption in ‘ability driven education’ is that every child has some talent or ability though the sphere of the talents differs as identified in J. Guilford’s and H. Gardners’ theories. Research has shown that through accommodating students’ learning styles or matching teaching and learning styles, individuals’ development and potentials can be maximised. One such type of research is the aptitude treatment interaction (ATI) which assumes different types of instruction can be designed to complement characteristics of learner.

Distinguish related terms of learning styles

Frequently related terms have been loosely used interchangeably and synonymously even though there may be some fine lines of differences. Distinguishing terms, definitions, and certain vocabulary are important as they clarify meanings, avoid vagueness, allow for more definite references, and make scope more precise. References like dictionaries of psychology can be of great help to obtain the meanings and an elaboration of the terms. For example, there is a need to distinguish the following related terms.

Terms	Definitions
Learning styles	Conditions under which an individual is most likely to learn, absorb, retain new and difficult information and achieve.
Cognitive styles	Information processing characteristics that indicate an individual's way of understanding, thinking, remembering, and solving problems.
Dominance	The condition or fact of one member of a paired organ being the one principally used to carry out a task. E.g. foot, eye, hand, brain
Hemisphericity/brain dominance	The tendency to use one side of the hemisphere more than the other.
Lateralisation	The fact that two lateral halves (hemispheres) of the brain are somewhat specialised
Brain asymmetry	The idea that two sides of the normal brain are different naturally
* Whole brain functioning	* Integrated functioning of the brain
* Holistic	* Able to perceive and understand the 'big picture' without dwelling on individual elements of an idea
Metacognition	Thinking about how to accomplish a thinking task; awareness of own cognitive processes and exert control over them.
Metalearning	What do I want out of this (motives) and how do I propose going about getting there (strategy).
Thinking	Mental activities to find meaning assumed to exist already or to make meaning out of something that has no readily apparent meaning.
Creative thinking	State of mind to see things in a new way that can result in inventing new combinations, and putting things together in new and novel ways.
Critical thinking	Judgmental aspect of thinking through mental operations like detecting bias, and determining credibility.
Learning strategies	Thinking about different approaches to harness the potential of learners to solve problems e.g. planning ahead, monitoring one's own performance, checking, and self test
Study skills	The area of work that is directed to improve students' study habits e.g. note taking, use of dictionary, understanding tables, organise study time, how to plan an essay.

Name learning style advocates

It would be useful to know names of some learning style advocates because very often references in the literature can be made by names. Equally important is the association of names to learning style domains and models. Some of the names are included below.

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| 1. Rita Dunn, Kenneth Dunn, & Gary Price | 8. Paul Torrance |
| 2. Joseph Renzulli | 9. James Keefe |
| 3. Ronald Schmeck | 10. John Biggs |
| 4. Anthony Gregorc | 11. Myers Briggs |
| 5. David Kolb | 12. Harold Gordon |
| 6. Herman Witkin | 13. Bernice McCarthy |
| 7. Ned Herrmann | 14. David Hunt |

Define learning styles' differently

Learning style advocates define learning styles differently. The definitions differ according to the different learning domains as interpreted by the learning style advocates. The table below provides the different interpretations.

Definition of learning styles according to the learning style domains	Learning style advocates
Conditions/stimuli	Rita Dunn, Kenneth Dunn, & Gary Price
Conceptual level	David Hunt
Perception & ordering	Anthony Gregorc
Perception and processing	David Kolb
Instructional modes	Joseph Renzulli
Brain functioning	Paul Torrance, Bernice McCarthy, Harold Gordon
Mental preferences, thinking, & brain functioning	Ned Herrmann
Learning strategies	Ronald Schmeck
Motives & strategies	John Biggs

Associate learning style terminology with learning style advocates

Different learning style advocates ‘coined’ different vocabulary to describe learners who embody certain learning characteristics. The characteristics may overlap though they are labeled differently. The table below provides some examples.

Learning style terminology	Learning style advocates who coined the terms
Conditions/stimuli: <ul style="list-style-type: none"> • Environmental • Emotional • Sociological • Physiological • Psychological 	Rita Dunn, Kenneth Dunn, & Gary Price
<ul style="list-style-type: none"> • Diverger • Accommodator • Assimilator • Converger 	David Kolb
<ul style="list-style-type: none"> • Dynamic • Analytical • Imaginative • Common sense 	Bernice McCarthy
<ul style="list-style-type: none"> • Surface • Achieving • Deep 	John Biggs
<ul style="list-style-type: none"> • Elaborative processing • Deep processing • Fact retention • Methodical study 	Ronald Schmeck
<ul style="list-style-type: none"> • Right and left brain functioning 	Harold Gordon, Paul Torrance, Bernice McCarthy, Robert Zenhausen
<ul style="list-style-type: none"> • Field dependence • Field independence 	Herman Witkin
Instructional preferences: <ul style="list-style-type: none"> • Lecture method, simulation, recitation, peer teaching, discussion, games, independent study, lecture, programmed instruction 	Joseph Renzulli

Familiarise with and evaluate learning style instruments

The ‘accuracy’ of diagnosing learning styles in order to obtain a meaningful learning style profile depends very much on how appropriate the selected instruments are. Examples of learning style instruments are provided in the table below.

Learning style instruments	Learning style domains	Names of developers
Learning Style Inventory (1985)	Conditions/stimuli under which an individual is likely to learn, absorb, retain information, and achieve	Rita. Dunn, Kenneth Dunn, and Gary Price
Learning Styles Inventory (1978)	Instructional modes: recitation, peer teaching, discussion, games, independent study, programmed instruction, lecture, & simulation	Joseph Renzulli and Linda Smith
Inventory of Learning Process (1982)	Learning strategies: elaborative processing, deep processing, fact retention, methodical study	Ronald Schmeck
Embedded Figure Test (1969)	Perceptual functioning: field dependence, field independence	Herman Witkin
Learning Styles Inventory (1986, 1998)	Perception & processing: diverger, converger, accommodator, assimilator	David Kolb
Gregorc Style Delineator (1982)	Perception & ordering: concrete sequential, abstract sequential, concrete random, abstract random	Anthony Gregorc
Hemispheric Mode Indicator (1993, 1998)	Left & right brain approaches to learning	Bernice McCarthy
Cognitive Laterality Battery (1986)	Brain hemispheric preference	Harold Gordon
Herrmann Brain Dominant Instrument (1990)	Mental preferences/thinking styles/brain functioning	Ned Herrmann
Your Style of Learning & Thinking (1988)	Brain hemispheric preference/thinking	Paul Torrance
Paragraph Completion Method (1978)	Conceptual level: independent, dependent, unsocialised	David Hunt
Learning Process Questionnaire (1985)	Motives and strategies approaches: surface, deep, and achieving approach and strategy	John Biggs
Learning Style Profile (1989)	Cognitive, affective, physiological, environmental domains	James Keefe, John Monk and others

A useful reference to know is the two volume ‘Tests in Print’ which documents a range of learning style instruments including other tests. Instruments are easily located through the author, title, and subject indexes. Useful details like author of the instrument, domains the instruments measure, scoring, price, publisher, addresses are also provided.

Because of the range of learning style instruments, teacher researchers must be able to determine the quality of the instruments. The criteria below may be helpful for the selection of instruments.

- Are they developed from research base or experiments?
- Does the continuum in the items measure what is defined as learning style?
- Do the items measure the domains in the objectives of your study?
- Are they easily available or accessible?
- Are they affordable?
- Do they allow for immediate self scoring versus computer scoring or company scoring?

- What are their validity and reliability like?
- Are they accompanied by a clearly written manual or handbook?
- Do they allow for large group versus individual administration?
- Do the researchers need special training or be licensed?
- Are there many studies that use the instrument for research?
- Are the instruments well documented in the literature?
- Are they preference inventories or performance tests?
- Is the vocabulary level suitable for your sample?
- Do the instruments reflect bias in terms of culture, language, references made to objects, gender, and race?
- Do they allow for duplication of multiple copies?

Keep abreast with learning style research trends and issues

Teacher researchers should keep tap of research trends and issues so as to keep abreast of the field, the types of research done by fellow researchers world wide, and the impact of the findings on learning. Keeping abreast of such information can also be done through the use of electronic databases, bibliographies, and by attending conferences, workshops, and seminars. The following table provides some trends of learning style research.

Learning style research trends	Some research issues
1. Diagnosis of learning styles	<ul style="list-style-type: none"> • Is there a right 'style match' for a particular profession/task/discipline? • Must all styles be diagnosed? • Do individuals know their own learning styles? • What is the finding of self perceived versus measured learning styles? • What would learning style profiles look like in terms of gender, academic achievement, performances in various disciplines, age groups, and ethnic groups? • Can styles be changed? • Is there a 'best' style? • What is the relationship between intelligence and styles? • When should one assess styles? • How 'good' are the instruments to identify learning styles? • Must styles always be measured by instruments? Is there a place for intuition or 'gut feeling'?
2. Accommodating styles/Matching teaching and learning styles	<ul style="list-style-type: none"> • How do teachers accommodate style diversity in large group instruction? • To what extent can teaching through students' learning styles increase academic achievement, performances, change in learning attitude, and motivate the learners? • Should students adapt to teaching styles or should teachers change to accommodate students' styles?
3. Brain functioning diagnosis	<ul style="list-style-type: none"> • How is brain functioning related to gender, age, academic performances, and ethnicity? • How is brain functioning related to learning style domains like perception, processing, instructional modes, emotional, sociological, environmental, and physical stimuli? • Can brain functioning diagnosis predict learners achievement, potentials to achieve, and thinking patterns? • Can individuals' potential abilities in music and art be distinguished by brain functioning diagnosis? • What is the brain functioning of different professionals? • Can brain functioning profiles be used to match workers with their responsibilities?

Conclusion

Mastering the basic knowledge on learning style is crucial. It establishes a firm and basic content grounding on learning style prior to the teacher researcher embarking on the implementation of the research.

Teacher researchers will encounter some realistic problems when implementing learning styles in the classroom. Learning style research does provide a substantive framework for teachers to appreciate learning styles as a non traditional approach of looking at learning, instruction, and classroom activities related to learners' characteristics. As students learn differently, then they should be taught differently. All these call for another look at the current modes of instruction and assessment. Learning is a process that occurs in students' minds and how information is presented and learned is vital.

Learning style research findings can be utilised to

- identify sets of variables in terms of environmental, sociological, emotional, physical, and psychological factors that may determine whether the learners find a lesson exciting or boring
- place learners in their preferred learning environment
- remove obstacles that may inhibit or 'demotivate' the learners
- develop matching methodologies and curriculum that will support, reinforce, and complement the learners' learning style preferences
- recognise and realise the fact that there is a horizontal dimension (learning preferences) versus the traditional vertical dimension (IQ) to compare relative performances of learners.

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