

Matching Teaching Pedagogy with Learning Styles of Students- Insights through Literature Review

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Abstract:

Learning styles/preferences have been an area of discussion in conferences as well as journals. Literature is rich with learning theories, different learning/cognitive styles given by various researchers. All of these elicit one common fact that individuals learn differently. Since individuals learn differently, would it be a valid point that teachers should teach different kinds of learners differently. This is what is known as Matching Hypothesis. Viewpoints of various theoreticians for matching hypothesis have been objectively discussed. Pedagogical implications for administering learning style inventories in educational institutions have been cited here. Primary research conducted by various researchers has been cited in this paper. Apart from this, with specific emphasis to NLP that suggests three learning sub-modalities- VAK (visual, auditory and kinesthetic), recommendations have been made for these three types of learners for optimum learning.

Keywords: cognitive styles, learning styles, learning preferences, sub-modalities, matching hypothesis

I. INTRODUCTION TO LEARNING STYLES

"Because we each have a unique and individual style of learning, thinking and communicating, it is desirable that we interact differently with information. Society needs all kinds of thinkers; each expressing different mental strengths." - Connerr, 2008

O my mind, behave yourself.

I am forcing you to learn, and you retaliate.

O my owner, calibrate yourself.

I need my style when I encapsulate.

Human mind seems to have a strange behavior. Sometimes, learning comes easy and sometimes, it is so difficult to learn. Learning styles account for differences in learning of different individuals. There are several debatable theories in the field of learning styles. These theories suggest that all the learners can be categorized on the basis of their styles of learning. Different theoreticians have proposed different classifications. All these theories have one common concept that individuals learn differently. Some definitions are as follows:

"Self-consistent, enduring individual differences in cognitive organization and functioning" [1]

A learning style is not in itself an ability but rather a preferred way of using one's abilities [2].

"Distinctive behaviors which serve as indicators of how a person learns from and adapts to his environment"[3].

This paper is based on secondary research. Information that was gathered from different sources, including scholarly journal articles, pertinent scholarly articles available on websites and books. From reviewed sources, the reference lists for citations were further reviewed. EBSCOhost platform and internet was used to search multiple databases for relevant conceptual, theoretical and research articles.

After the above general introduction to learning styles, an elaborate introduction of visual, auditory and kinesthetic learning styles has been given. The paper proceeds with explaining similarities and differences among the three terms- style, preference and strength in the world of modalities. Henceforth, various research projects conducted in the field of learning styles have been given respectable space. The paper further explains that learning styles/preferences are dynamic in nature and modalities integrate. Further on, the paper brings out pedagogical implications suggested by various researchers. Recommendations for faculty members and students with different learning modalities follow. Finally, conclusions conclude the paper.

II. VISUAL AUDITORY KINAESTHETIC (VAK)

Different learning styles have been given by various researchers. One among these is Walter Burke Barbe and team (1979), conceiver of VAK which has its roots in Neuro Linguistic Programming (NLP). Since NLP theorizes human excellence; it suggests that human differences should be taken into account in order to maximize their potential. Visual learners (that include Read/Write mode also) depend on pictures/words in written form for memorization. They prefer to read than be read to. They are good with spellings and are least distracted by noise. They are usually well-groomed, orderly and more organized. Most often, their body posture is straight with their heads and eyes up. These learners breathe from the top of their lungs. A visual learner is affected by glances. Reference [4] demonstrated that visual learners depend on pictorial demonstrations (pictures, flow charts, and diagrams), films, and demonstrations in

order to learn. They find sketches, photographs, schematics, flow charts or any other visual representation of course material which is heavily loaded with words. They draw concept maps listing key points, enclosing them in boxes or circles, connecting the concepts through lines. They are in the habit of color coding their notes with highlighter so as to make content under one topic in the same colour. Common phrases used by them are: see you later, let's look at it, let's focus, be clear, notice, it appears etc. Auditory learners can repeat the conversations easily. They learn by listening and like music. They learn processes sequentially and step by step. Tone of voice affects them. Their eyes move sideways and also down-right. They breathe from the middle of their chest. Common phrases include sounds, speak, talk, listen, hear etc. Kinesthetic learners talk very slowly. They prefer standing close to people and touching them. Their breathing point is bottom of their lungs. They learn and memorize by doing. They have physical orientation (move a lot). Common phrases include feel, touch, grasp, hold etc.

III. MODALITY – STYLE/ PREFERENCE/ STRENGTH

The term 'style' introduced by [5] in psychology, refers to the consistent patterns of behavior and activity [6]. The term always relates to individuality coupled with consistency and stability and it has gained popularity since seventies [7]. Today, it's a common denominator in educational research.

Modality strength and modality preference are also two different terms. A modality strength implies superior functioning in one or more perceptual channels and its assessment tool is a task of some kind, as in the learning methods test (Mills,1970 as cited by [8]). A modality preference on the other hand, is a self-reported preference.

IV. PRIMARY RESEARCH- SOME GLIMPSES

1. Sri Lanka : Reference [9] researched the distribution of learning styles among first year undergraduates in three Universities of Sri Lanka. There were 34% convergers, 29% accommodators, 10% divergers and 25 % assimilators among the students who enrolled in Engineering.
2. Iran: Reference [10] on the basis of a sample of 250 students, showed that the maximum number of Nursing and Midwifery students enrolled in Tabriz University of Medical Sciences in Iran were convergers (54%) and assimilators (32%). A study was conducted on medical students of a medical sciences university in west of Iran, in 2010. 41.8% participants were uni-modal and 58.2% preferred to use multiple learning styles. 17%, 13.4% and 27.6% preferred bi-modal, tri-modal and quad modal styles respectively[11].
3. The United States: In a study done in the US at Michigan in the year 2006 amongst first-year medical students, 43.45% preferred quad-modal and that 36.1% selected single modal learning styles[12]. Between visual and verbal learners, visual learners maintained higher academic success rates; scale used was The Index of Learning Styles by Felder and Solomon [13]. In another study conducted at Liberty University, degree of match scores and students' achievement showed poor statistical correlation in all academic areas[14].
4. Australia: In a study done on nursing students in Australia, 16% students chose quad modal(four modalities) and 47% preferred single modal learning styles [15]. In yet another research conducted in Australian Catholic University, on first year nursing and midwifery students using VARK questionnaire, with pre-post design ($n = 96$), 45% of students remained in the same VARK mode, 30% became more multimodal and 25% showed changes. A different inventory, LSI questionnaire showed similar results with 45% of students remaining in the same learning modality and 55% of students changing. This research depicts dynamic changes within students' information processing and instructional preferences[16].
5. Chile: Three cohorts (2008, 2009, and 2010) of second-year undergraduate medicine and sport science students, Universidad de Santiago de Chile, Santiago, Chile participated in this study. Usage of MCQs showed no significant differences however when arithmetic questions were given to solve, unimodal R students performed the best[17].
6. Malaysia: Learning style inventory (Kolb, 1984) was administered on the sample that consisted of 136 first year engineering students from a public university in Malaysia. Assimilators, Convergers, Accommodators, Divergers were found to be 44.9%, 34.6%,13.2% and 7.4% respectively[18]. As per another study, a correlation test conducted on learning style and academic performance of 545 students at Universiti Kebangsaan Malaysia in 2010. Grasha-Riechman (1994) Learning Style Inventory was used. It was found that there was a low relationship between Collaborative and Competitive learning style and CGPA[19].
7. India: In another study conducted on First Year BDS students in Nagpur, India, 36% students preferred unimodal while 64% students preferred multimodal type of learning style. In unimodal style; 47.22% students preferred kinesthetic, 27.77% auditory, 19.44% read/write and 5.55% preferred visual. In multimodal type; the highest preference was given to quadra-modal (45.31%) followed by tri-modal (28.12%) and Bimodal(26.56%) [20]. A research was conducted on management students of a single campus of Pune city, Maharashtra , India. 102 students were selected for the study. Honey and Mumford's (1992) Learning Styles Questionnaire (LSQ) that is 40 items questionnaire was used. Results showed 43% ,33%,21% and 17% to be among activist, theorist, pragmatist and reflector respectively. Gender and educational background was also taken into account.[21]. Reference [22] conducted a study on physiology students in South India revealed that 55% of first year dental students preferred unimodality. This study used VARK questionnaire. One more study [23] that used VARK questionnaire and was conducted on dental students of two dental colleges in Mangalore and Ahmedabad revealed that most of the students preferred multimodality and those who prefer single modality used Kinaesthetic preference.

8. Denmark: As per a research conducted at the Aalborg University, first year engineering students at the University are more active than reflective. This result leads to a conclusion that reflection and conceptualization should be facilitated further in the curriculum to enhance critical thinking among students [24].
9. Sweden: In a research conducted on 78 teaching students and 78 nursing students in Sweden[25], Productivity Environmental Preference Survey (PEPS) was administered to identify the participants' learning style preferences. More nursing students showed high level of motivation as compared to teaching students. More of them were found to be kinesthetic too and preferred authorities. More teaching students showed high level of persistence.
10. Cross-cultural: A research was conducted on undergraduate business students of US, India and Korea[26] and used Kolb's inventory revealed that US students prefer reflective observation and concrete experience, Indian students have preference for active experimentation and abstract conceptualization and Korean students prefer reflective observation and abstract conceptualization. Another cross-cultural study[27] conducted among computer engineering students of AUS,UAE and UMD, US revealed that these students despite being culturally diverse display similarity in learning preferences.

V. DYNAMICS OF LEARNING PREFERENCES AND MODALITY INTEGRATION

One notion about learning preferences is that these are static [28, 29]. It is vital to understand that Kolb conceives of learning styles not as fixed personality traits, but as adaptive orientations that attain stability through consistent patterns of transaction with the outside world. A learning style is a 'differential preference for learning, which undergoes situational change. However, there's some long-term stability in learning style' [30]. At the same time, some longitudinal studies have supported the notion that student learning styles may be adaptable to teaching styles [31]. However, the extent to which learning styles can be extended to suit a particular situation varies [32]. Onion ring model proposed by Curry suggests an inner 'Information processing' style which is stable (assessed by instruments such as Kolb Learning Style Inventory) in comparison to the outer 'Instructional preference' style (assessed by the VARK/VAK questionnaire or other self-reported inventories).

Kolb suggests that each learning environment, and each academic discipline or profession imposes specific demands on the learner [33,34]: different disciplines have varied learning requirements and incline towards different styles of learning. Students are likely to opt for an academic discipline which matches their learning style and which, through socialization in the course of learning in that discipline, as a result, enforces it. For the notion that student learning styles are static, instructional methodologies in teaching styles need to be adjusted to fit student learning styles.

With age, maturity and experience, modalities integrate and one perceptual channel transfers information to another [35]. Reference [36] termed it 'intersensory transfer'.

VI. IMPLICATIONS ON PEDAGOGY

1. Incorporating learning styles in our teaching would lead to making teaching and learning a dialogue; help responding to a more diverse student body; help in communicating our message; make teaching more rewarding and ensure the future of several disciplines [37]
2. While so much has been suggested on adapting one's learning style according to teachers' teaching style, [38] believes that a misalignment between adaptive abilities of students and high demands on them due to teaching methods and styles would make students suffer. Teachers' awareness of their own styles and that of their learners can lessen the harm they might otherwise do and. Gregorc suggests not to force teachers and learners to act against their natural styles, believing that this might even alienate people or make them ill.
3. Learners have different learning styles because of different abilities. And **learners with different styles do not differ in ability**[39]
4. Students may be partly active while responding to questionnaires. They might not have done this very carefully so labeling students based on assessment results is not justified, as this would be counterproductive to a theory that supports diversity [40]. Some researchers explicitly term this labeling as pigeon-holing and stereotyping [41,42,43]. Teachers should utilize findings of the learning styles to assist them in broadening their teaching methods that should incorporate the variety of styles [44].
5. Though awareness about learning style inventories is gaining momentum in educational institutes of various countries and they have an inclination towards administering the assessments, teachers can still decide to inform students about learning styles. Research has been unable to provide any evidence regarding beneficial aspects of matching styles to impact students' academic achievement. Literature is supportive of the viewpoint that addressing to different learning styles may be better than customizing teaching instruction to precisely match student preferences [45,46]. This would be a rather liberal view.
6. Learners are advised to develop a repertoire of styles. Teaching strategies should cover all these styles in a formal program in the form of lectures, seminars, tutorials and practical labs. A range of such approaches will be helpful in conforming to all the learning styles.
7. Matching hypothesis is built on aptitude-treatment interaction (ATI) research [47]. ATI hypotheses can be seen in ancient Chinese and Hebrew writings on education, in early Greek and Roman teachings, and in some European educational philosophies across the centuries [48]. Aptitude-treatment- interaction (ATI) research is a research that attempts to evaluate how an outcome depends on the match between specific aptitude of an individual and the kind of treatment they receive. In case of an optimum match, the effect of the treatment is

optimal. However this is not supported by reliable empirical evidence. The original ATI-researchers explicitly warned against such oversimplifications. Rigid application has not been suggested [49]. Also, psychometric quality of many learning style instruments is questionable [50,51,52,53,54].

8. Some theorists suggest that assessment inventories of learning styles should be used only for diagnostic purposes so that it is more of self-reflection tool. This self-awareness should offer a platform for teachers and students to talk more productively about learning.
9. This should also not be ignored that other variables such as motivation and meta-cognition also help in learning. Learning preferences don't impact the process of learning in isolation.
10. The success of using learning styles is hindered by the traditionalists. They consider the revolution a "pedagogical high-tension" which is instituted by "freaks of gifted education." [55]
However, the world of learning theories, learning strengths and learning styles can leave teachers bewildered.

VII. RECOMMENDATIONS

Since the differences in learning styles exist, they are affecting the learning and hence if addressed appropriately, there will be an enormous improvement in the learning and that more learning will occur substantially faster [13]. Following is a set of recommendations made to students as well as faculty.

A. Student Column

- 1) Visual Learning Preference

Highlight key words in the text, create concise flashcards, convert words into symbols, diagrams and pictures, practice visuals and words conversion, color code, create mental imagery and maps

- 2) Auditory Learning Preference

Read the text to oneself, recite to remember, record lectures and information and play it back regularly, use audio books. For problem-solving exercises, write down logical sequence of the process to be followed and read it loud, use buddy system to discuss problems.

- 3) Kinaesthetic Learning Preference

Choose to sit in front of the classroom, take study breaks, listen to the recorded notes while exercising, move around while reading aloud, understand the main theme of study notes or books by skimming through them, organize study material by creating charts and tables, use models and visit to the physical places that connect to learning, use music while studying (mozart effect)

B. Faculty Column

The only question to be addressed is not whether students should be taught differently; rather what needs further understanding is which differences should be addressed. A wide variety of instructional methods catering to different learning styles and the skill to use these methods will solve the problem. Also, that the best teachers will evaluate success by the attitudes and performance of the students [56]

Kolb suggests that there will be four benefits of explicit sharing of respective theories of learning among teachers and students. Students would be able to understand the rationale behind the way the subject matter is taught and if that calls for a mild change in learning preference among students, it would. Teachers may also customize their teaching style with those of the learners. Most importantly, both teachers and students would be 'stimulated to examine and refine their learning theories' [57]. Teacher's empathy towards students would also enhance learning.

Complex disciplines such as business are more demanding for learners of different preferences since in such cases; in-class as well as out-of-class activities need to be planned. This is how educators can link theory and practice in a complex yet real world [58].

Reference [59] states that they simply cannot disregard the concept of learning style, 'which express[es] some of their intuitions about students and which facilitate[s] appreciation for the divergent approaches to thinking and learning'. Deliberation of learning styles may prove to be the catalyst for change at three levels- individual, organizational or even systemic. However, it should not only lead to an approach that brings changes in teaching techniques. Reference [60] have argued the most fundamental problems of education are not pedagogical. It has got more to do with communities and fitment of an individual. Cultural and political aspects also influence.

VIII. CONCLUSION

It is concluded that learning style inventories are of major assistance in identifying learning preferences of individuals and these also help in reaching potential strengths and areas of improvement in how learners deal with content as well as learning activities [61]. These inventories help in reaching unique features of each individual and hence this concept deserves unique attention.

Content standards are important; however spotlight needs to return to learning preferences of students. It is relevant that high standards need to be maintained; however it should not be done at the expense of student learning [14]. It is also concluded that eventually it is the success of the students that matters the most. In order to attain this, students need to focus on what is being taught and teachers should be given liberty on the basis of trust that instruction methods can be fine-tuned and customized as per the needs of the students.

"Who would ever realize, without being told, that these minds experience links between simultaneous events- that the cloud formation in the sky outside the classroom window carries the same message as the teacher's words?" - Connerr, 2008

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