



## Learning Style On Mathematical Learning

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## ABSTRACT

This study involves the theoretical background of learning styles as well as VAK (Visual, Auditory, Kinesthetic) learning style model with their characteristics and analysis of different studies related to this model. This paper includes the studies on VAK learning style model with different variables. It describes how this learning style affects mainly the mathematics achievement, overall academic achievement, language vocabulary, achievement in relation to gender, etc. This study suggests that teacher can use different learning material according to students' preferred learning style to enhance the academic achievement of students. VAK learning styles show significant relation to mathematical connection ability, mathematics achievement, academic achievement, problem solving abilities and language vocabulary achievement. Students with visual styles are able to solve the mathematical problems systematically and completely and it is highly associated with the mathematics achievement.

Keywords : VAK learning style model, mathematics achievement, gender, academic achievement.

## INTRODUCTION

### What are Learning Styles?

You have probably noticed that when you try to learn something new you prefer to learn by listening to someone talk to you about the information. Or perhaps you prefer to read about a concept to learn it, or maybe see a demonstration. Learning styles can be defined, classified, and identified in many different ways. Generally, they are overall patterns that provide direction to learning and teaching. Learning style can also be described as a set of

factors, behaviours, and attitudes that facilitate learning for an individual in a given situation. These learning styles are characteristic cognitive, affective, and physiological behaviours that serve as pretty good indicators of how learners perceive, interact with, and respond to the learning environment.

Learning style is an individual's natural or habitual pattern of acquiring and processing information in learning situations. A core concept is that individuals differ in how they learn. The idea of individualized learning styles originated in the 1970s, and has greatly influenced education. Proponents of the use of learning styles in education recommend that teachers assess the learning styles of their students and adapt their classroom methods to best fit each student's learning style. Although there is ample evidence for differences in individual thinking and ways of processing various types of information, few studies have reliably tested the validity of using learning styles in education.

Different terms have been used in literature such as learning style, cognitive style, sensory preference, and personality types. Some of these terms, in some instances, have been used interchangeably, while in other occasions they have been differentiated (Cassidy, 2004). Learning style are defined as "the complex manner in which, and conditions under which, learners most effectively perceive, process, store, and recall what they are attempting to learn" (James and Gardner, 1995: 20), while cognitive styles are defined as "an individuals' natural, habitual, and preferred way (s) of absorbing, processing and retaining new information and skills" (Reid, 1995: viii). Mortimore (2003) makes a distinction between learning styles and cognitive styles. He indicates that learning styles are seen more in terms of the strategies that learners use to deal with learning, and are considered to be less stable. On the other hand, cognitive styles are relatively stable. Thus, learning styles, as opposed to learner preferences, can be stretched with the passage of time. It is to be noted that the distinction between cognitive and learning style is not crystal clear as some authors employ cognitive style as a more general term that includes learning styles (Williamson and Watson, 2006).

### Neil Fleming's VAK/VARK model

One of the most common and widely-used categorizations of the various types of learning styles is Fleming's VARK model (sometimes VAK) which expanded upon earlier Neurolinguistic programming (VARK) models:

1. visual learners;
2. auditory learners;
3. reading-writing preference learners;
4. kinesthetic learners or tactile learners.



Fleming claimed that visual learners have a preference for seeing (think in pictures; visual aids such as overhead slides, diagrams, handouts, etc.). Auditory learners best learn through listening (lectures, discussions, tapes, etc.). Tactile/kinesthetic learners prefer to learn via experience— moving, touching, and doing (active exploration of the world; science projects; experiments, etc.). Its use in pedagogy allows teachers to prepare classes that address each of these areas. Students can also use the model to identify their preferred learning style and maximize their educational experience by focusing on what benefits them the most.

The development of one's personality usually depends on learning styles and is often influenced by environmental, emotional, social influence and individual feelings. How to learn is different for each person. Some learners need to see more; some need to hear, and



some have to do something to the body using a series of activities. Rahman et al stated that in general, the learning style of each person consists of three types of visual style, auditory style and kinesthetic style. The types are as follows:

1. Visual learning style : It is a learning style through which people learn best when they see images of what they are learning; they are oriented to printed text and can learn through reading. Visual learners think in pictures and learn best through visual images. Individuals who have a visual learning style are well marked with behavioural characteristics as follows:

– neat and tidy;

– speaking quickly;

– planner and regulator of long-term is good;

– meticulous to detail;

– concerned with the appearance, both in terms of clothing and presentation;

– good speller and can see the actual words in their minds;

– given what is seen rather than what is heard.





VIDHYAYANA

2. Auditory learning style : It is a learning style in which people learn better when they hear what they are learning. Individuals who have an auditory learning style are well marked with behavioural characteristics as follows:

- talking to yourself at work;
- easily distracted by a commotion;
- they move their lips and read out loud when reading;
- glad to read aloud and listen;
- can repeat back and mimicked the tone, rhythm and timbre;
- find it difficult to write, but great storytelling;
- speaking in a patterned rhythm.



VIDHYAYANA

3. Kinaesthetic learning style : It is a style of learning by engaging, moving, experiencing and experimenting. Individuals who have a kinaesthetic learning style are well marked with behavioural characteristics as follows:

- speak slowly;
- responding to physical attention;



- touching people to get their attention;
- stand close when talking to people;
- always physically oriented and a lot of moves;
- has the early development of large muscles;
- learning through manipulating and practices.

### **Review of Literature**



Dobson (2010) compared learning style preferences and sex and course performance. His results showed that there was a relationship between learning style and sex and course performance, and also Bidabadi and Yamat (2010) did a study on learning style preferences. The results demonstrated that there was no statistically significant difference between the mean scores of male and female students' learning style preferences (Bidabadi, F. SH., &Yamat, H. (2010)). Mulalic, Mohd Shah, and Ahmad (2009) attempted to determine the learning styles of the students, and the differences in learning styles of the students according to their gender and ethnicity. Results revealed that the students' preferred learning style was Kinesthetic. They expressed minor preference for Visual, and Auditory. Wehrwein, Lujan, and DiCarlo (2007) carried out a research on gender differences in learning style preferences among undergraduate physiology students. Their findings showed that male and female students have significantly different learning styles. Bricheno, and Younger, (2004) revealed some unexpected results of a learning styles intervention. The analysis of data from the common VAK questionnaire suggested that contrary to expectations derived from assertions



within some of the literature, there was no significant relationship between gender and preferred learning styles. Individual boys did not necessarily prefer a kinesthetic learning style compared to a visual or auditory one; indeed, data from across the four schools reveals that few boys apparently held such preferences and that the proportions of boys and girls identified as having a kinesthetic learning style were very similar. Mohammadi, Alizadeh, and Sedaghat (2011) did research on divorce and problem solving style. The results revealed that most common problem solving styles among the participants were avoidance, approach and creativity respectively (Mohammadi, R., Alizadeh, KH., & Sedaghat, M. (2011)).

Sarvghad and Dianat (2009) conducted a study aimed at investigating the learning and problem solving styles of university students. The results of the study showed that there was a significant relationship between students' learning styles and their problem solving styles. It was also indicated that there was a significant relationship between students' major and the patterns of use of both learning styles and problem solving styles. Further, it was revealed that there was a statistically significant difference between the pattern of use of problem solving styles of male and female students (Sarvghad, S., & Dianat, A. S.(2009)). Babapour, Rasoulzudeh TabaTabei, FathiAshtiani, and Ezhehei (2003) conducted a study on the relationship between problem solving styles and psychological well-Being among university students. They revealed that there is a partial gender difference between males and females in problem solving styles, so that females utilize avoidant problem solving style more than males (Babapour, K. J., RasoulzudehTabaTabei, k., Fathi Ashtiani, A., & Ezhehei, J. (2003)). Cassidy (2002) investigated the relationship between problem solving style, achievement motivation, psychological distress and effectiveness in an emergency in 107 volunteers in a simulated aircraft disaster. Effectiveness was measured in terms of the speed of egress averaged across four trials and the total number of bonuses earned. The best predictor of speed of egress was problem-solving confidence, while those who earned most bonuses tended to score higher on problem solving creativity, dominance and status aspiration.



Shahin Gholami & Mohammad S. Bagheri (2013) conducted a study to investigate the relationship between VAK learning styles and problem solving styles regarding gender and students' fields of study. The results of the study show that there is a positive relationship between VAK learning styles and problem solving styles at the 0.01 level of significance. No statistically significant gender difference in VAK learning style category was found between females and males, but gender has an effect on one style of problem solving styles; Fields of study have no effect on VAK learning styles and problem solving styles.

Rahman A. & Ahmar A. (2017) examine the relationship between learning styles and learning outcomes by gender. The population in this study were all students in 1st year of SMAN Galesong Selatan, Indonesia, in the 2014/2015 academic year. The instruments used in this research was the test of modalities learning styles (TMLS), to determine whether the students' learning styles are visual, auditory and kinesthetic (VAK), and documentation. The relationship between learning styles and learning outcomes were analysed with the chi-square test and two-way ANOVA. The results of this study showed that 1) the learning styles of visual and auditory learning styles is dominated by women; and 2) there is no relationship between the variables of learning styles, genders and interaction of learning styles with genders to learning achievement.

Rahmah Wahdaniati Suaib (2017) conducted a study using two groups, one received treatment (teaching vocabulary by Visual Auditory Kinesthetic learning styles) and the other group the researcher just provides the same material without receive the same treatment but it was by taught memorizing vocabulary. Both groups were given pretest and post-test. The pre-test was given to find out the prior knowledge of students while the post-test was given to find out the effectiveness of English teaching which focused on vocabulary by using Visual Auditory Kinesthetic learning styles. The researcher concludes that: 1. The use of Visual Auditory Kinesthetic learning styles in teaching vocabulary improved the students' achievement. 2. The students' interest in the use of Visual Auditory Kinesthetic learning styles was categorized very high. Based on the conclusions above, it is strongly suggested



that the use of Visual Auditory Kinesthetic learning styles use to avoid monotonous teaching technique especially in teaching vocabulary.

Ahmad S, Safee S, Wan Mohamad Asyraf Bin Wan Afthanorhan (2014) in their study, the clusters of learning styles have been identified as four groups. Male and female have differed type of learning styles. By inspecting through the finding, there are two clusters for male while four clusters for female. There is no significant difference between learning style towards mathematics achievements. The difference of learning style between students doesn't give an impact on mathematic achievements. There could be other possible predictor of academic performance.

Mazlini Adnan, Mohd Faizal Nizam Lee Abdullah, Che Nidzam Che Ahmad, Marzita Puteh, Yenyi Zaura Zawawi and Siti Mistima Maat (2013) conducted the study at boarding schools of high performance schools. However, the finding of this study has given insight on the HPS students' learning style. In conclusion, most students of HPS tend to have visual learning style. There is a significance difference in visual, verbal, sequential and global learning style based on gender. The relationship between learning style mathematics achievement are found to be weak.

Rajshree S. Vaishnav (2013) founds the Kinesthetic Learning Style to be more prevalent than Visual and Auditory Learning Style. There exists positive high correlation between Kinesthetic Learning Style and academic achievement of students. Very negligible positive correlation was found between Visual Learning Style and academic achievement of students. Whereas positive low correlation between Auditory Learning Style and academic achievement of students. Therefore, Kinesthetic Learners are more benefited in traditional classroom at secondary level. There exists significant effect of Different Learning Styles and academic achievement of students.

Apipah S., Kartono and Isnarto (2017) found the quality of VAK learning with self-assessment toward the ability of mathematical connection performed by VIII grade students. VAK learning model that is applied to discover mathematical connection ability of VIII grade students by completing mathematical connection questions quantitatively can be considered high grade as can be proved from (1) the mean of students' mathematical connection in VAK learning more than KKM, (2) the proportion of students from experimented class who achieve completeness score as much as 79 more than 75%, (3) the completeness proportion of students' mathematical connection in VAK learning with self-assessment is more than the completeness proportion of mathematical connection in expository learning, (4) the mean of students' mathematical connection in VAK learning is higher those in expository learning. The characteristics of mathematical connection ability are different from one student to others based on their applied learning style. Those differences can be seen from students with visual learning style who are able to write down steps to solve problems systematically and completely. The characteristic of students with auditory learning style is that they are able to write down steps on solving problems systematically, but they do not write the solving quite completely. Meanwhile, the characteristics of students with kinesthetic learning style are that they are less careful in answering questions, they prefer to thinking while doing something, and they are able to write down the solving problems systematically but incompletely.

## DISCUSSION

From the above studies we can say that there is no significant relation between learning style preferences in relation to gender. Male and female have significantly different learning styles. Also there is no relation between learning styles to learning achievement. Learning styles of students are significantly related to the problem solving styles of them. There is a positive result of using VAK learning styles in teaching vocabulary. It improved students' achievement in vocabulary. There is a significant relation between mathematical connection ability and learning styles. Students with visual styles are able to solve the



mathematical problems systematically and completely. There is a significant relation between the learning styles and the mathematics achievement.

## CONCLUSION

The use of VAK leaning model is considered well-qualified, and it can enhance students' mathematical connection ability. Furthermore, VAK learning model can be benefitted as an option to conduct learning in order to develop mathematical connection ability. Teachers should observe and give different method to each student based on their learning style. Students with visual learning style tend to think by using pictures or illustrations. Thus teachers can give learning materials involving pictures, illustrations, tables, or graphs. Students with auditory learning style prefer to think fast so that teachers can deliver learning materials through discussion and question-answer session. Students with kinesthetic learning style tend to think while doing something, so teachers can give learning materials through some activities, such as using properties. To enhance the academic achievement of students, teacher can create the learning material according to student's preferred learning styles. Teachers are suggested to utilize Visual Auditory Kinesthetic learning styles in the classroom as it can give a new atmosphere in the classroom.

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VIDHYAYANA

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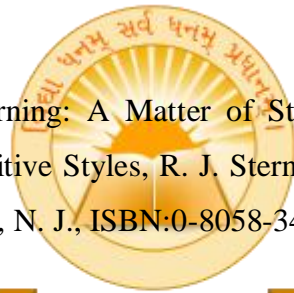
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VIDHYAYANA

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VIDHYAYANA

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VIDHYAYANA

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VIDHYAYANA

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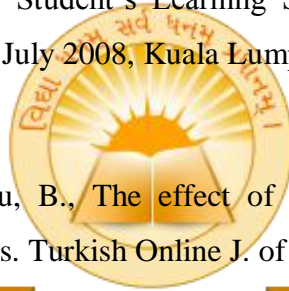
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VIDHYAYANA