



Research Article

IMPACT OF STUDENTS' PREFERRED LEARNING STYLE ON THEIR ATTITUDE TOWARDS STATISTICS

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ABSTRACT

Students have different attitudes and beliefs regarding the course of statistics, which affects the way that they will perform within the classroom and their behavior after they leave the classroom. Their performance and learning ability is also affected by different learning styles, all of which contribute to their attitude towards a particular subject. Therefore, the objective of this study is to determine whether different learning styles (Visual, Aural, Read/Write and Kinesthetic) helps to predict student's attitude towards the subject of statistics. After detailed literature review it was hypothesized that students' learning style will predict their attitude towards statistics. Students were taken from the University of Karachi all of whom were enrolled to take the one Statistics course in the field of Social Sciences. This sample was taken from both Masters level students and MPhil students from the Department of Psychology, University of Karachi. For this Attitude towards Statistics (ATS) (Wise, 1985) and V.A.R.K (Visual, Aural/Audio, Read/Write and Kinesthetic) by Fleming & Mills (1992) was administered. Descriptive statistics along with correlation and regression analysis were applied for statistical analysis of data using Statistical Package for Social Sciences (SPSS, V 21.0). It was revealed that Kinesthetic mode of learning not only has a positive correlation with the Attitude towards Statistics as a whole and its sub-scales (Attitude towards Course and Attitude towards Field), but also significantly predicts these variables. In addition it was also observed that Read/write and Kinesthetic style of Learning significantly predicts Exam Performance.

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INTRODUCTION

Knowing the learning styles of students is now a valuable skill in education. It allows us to understand the problems that students might face in learning and how studies can be modified to turn students into effective learners. Learning style is defined as an amalgamation of cognitive, affective and physiological characters that are indicative of how a learner perceives, interacts and responds to the learning environment. (Karagiannidis & Sampson, 2004) According to Kolb and Kolb (2005) there are variations in learning based on student preference. These variations are based on heredity, past experience and demands of the present environment. Fleming and Mills (1992) suggested four modalities through which people learn, these being: visual, where by a person prefers depiction of information in chart form or maps and flowcharts. In Aural a person prefers to learn through lectures, group discussions, radio and speaking.

In Read/Write a person prefers learning through the information displayed through words, while Kinesthetic learners prefer learning through experience and practice. All these different learning styles have an impact on a person's attitude towards courses taken at university, including statistics, where the course is aimed to improve student's statistical problem solving, statistical literacy and data analyzing skills. (Moore, 1990) A person may have preference for one kind of modality or may be multimodal, meaning preference for more than one kind of modality. A learner's preference for modality does not mean that it could be considered a strength. The main goal of getting knowledge about learning styles is to overcome difficulties faced during learning. While there are numerous studies conducted regarding VARK, one of those studies, conducted on Turkish medical students in their first year revealed that while the learning styles did not differ across gender, most of the sample was multimodal and among those who were unimodal, most of them preferred the kinesthetic learning style. (Bekan & Nakar, 2007) In another study, VARK learning styles were applied to online education where students are more likely to have stronger visual and read-write learning style. (Drago & Wagner, 2004).

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In this case, the subject of statistics is taken, in which students have to use a structural method to solve problems. The attitude of the students towards this subject, as well as their anxiety towards it is measured against different learning styles. Majority of the students find this subject difficult because of their lack of interest and the lack of motivation towards it. (Fullerton &Umphrey, 2001) In a study where first year university students were inquired about their attitude towards statistics it was seen that they made a positive effort in trying to understand the subject better, despite the difficulty, interest and student capability. (Ashaari, Judi, Mohammad, TengKu&Wook, 2011). The present study was designed to see the impact of learning styles on the attitude of Social Sciences students towards Statistics. Most of these students have not studied any mathematics related subject since their matriculation. It is mostly then difficult for these students to plan on how to study for their course, and in turn they find the subject to be problematic. Literature has shown us that we all use all types of learning style in different situations, it's just that we prefer one or more on the others. The purpose of the present study is then, to see if certain learning style predicts better attitude towards Statistics. In the light of the above literature review, it was hypothesized that learning style would predict attitude towards statistics and also exam performance in the same.

METHODOLOGY

Participants

A total of 65 students (including both men and women) from Department of Psychology, University of Karachi, Pakistan, voluntarily participated in the present study. Out of all, 13 students were from MPhil course work and rest of the 52 were students of MA previous or 3rd year hons (both morning and evening). The data was collected from the students enrolled in the statistics course in year 2015. A total of 80 forms were distributed, out of which only 65 were returned. All the participants were taught Statistics by the same teacher. By collecting data from this group, the teaching style was controlled.

Measures

Demographic Information questionnaire: A questionnaire containing socio-demographic information like age, gender, grade level, etc.

Attitude towards Statistics (ATS) (Wise, 1985)

The scale, which contains 29 items, is divided into two subscales. One, that measures the attitude towards the field of statistics (20 items) and another, which measures the attitude towards the course (remaining 9 items). The response scale from 1 (strongly disagree) to 5 (strongly agree) will allow the student to respond to how they currently feel about the statement (for eg: I feel that statistics will be useful to be in my profession). For both subscale scores, the two factor solution was supported along with a high internal consistency (~ .90) Further support for the distinctiveness of the subscale scores came from correlations with course grade. The positive predictor of course grade was the attitude towards the course and a null relationship was found between the course grade and the attitude towards the field subscale.

V.A.R.K (Visual, Aural/Audio, Read/Write and Kinesthetic) developed by Fleming & Mills (1992)

The VARK measures four different perceptual preferences for the input of information, which are visual (V), aural (A), read/write (R), and kinesthetic (K). There are 16 scenarios in which one has to identify all the information processing modes one could adopt in each of the scenario. The overall score for each learner's preference is counted by the number of ticks given for each category for the specific mode of information processing. The participants are allowed to pick more than one choice from each scenario. All the participants are then given a score on each of the four learning style.

Procedure: The participants were approached in their classes and the forms were given to their Class Representatives (CRs). All the students were informed of their rights of voluntary participation in this research. They were also told that their individual results will be kept completely confidential and only the overall results will be published. However if they want they can come and discuss their individual results in person. All the potential participants were thanked in advance for their participation in the present study. The CRs were then asked to collect all the filled forms and return it along with the forms that are left empty. By the end of a week's time most of the filled and empty forms were returned. Their exam marks were retrieved from the copy of result sheets submitted.

RESULTS

The Attitude towards Statistics (ATS) was scored according to the instructions given by the author. However, for VARK, the total of each sensory modality was entered in an excel sheet and emailed to the author, who, within a week returned the excel sheet by adding the Standard and Research Algorithm for each participant. The data was then transferred to IBM SPSS Statistics 21 and along with other variable scores, data analysis was done.

Table 1. Frequency and Percentage of Sample in accordance with preferred learning styles

Learning Styles	Frequency	Percentage
Visual	4	6.4
Aural	5	7.8
Read/Write	4	6.4
Kinesthetic	13	20
Bi-modal	12	18.6
Tri-modal	3	4.8
Multi-modal	23	36

Table 2. Correlation between the Learning Style (VARK) and the Attitude towards Statistics

	Attitude towards (Course)	Attitude towards (Field)	Attitude towards Statistics (Total)
Visual	.249*	.214	.228
	.045	.087	.068
Aural	.140	.078	.116
	.266	.537	.358
Read/Write	.285*	.167	.229
	.021	.183	.067
Kinesthetic	.310*	.375**	.356**
	.012	.002	.004

*p<.05**p<.01

Table 2 shows that visual and read/write mode of learning are significantly correlated with attitude towards course ($p < .05$) whereas Kinesthetic mode of learning is significantly correlated across both subscales and the overall attitude towards statistics ($p < .01$).

Table 3. Correlation of Exam Performance with different Learning Styles and Attitude towards Statistics

	Exam Performance
Visual	.307* .013
Aural	.090 .476
Read/Write	.326** .008
Kinesthetic	.334** .007
Attitude towards (course)	.497** .000
Attitude towards (field)	.391** .001
Attitude towards Statistics (Total)	.445** .000

* $p < .05$ ** $p < .01$

Table 3 showing that except for the Aural Learning style, all others are significantly positively correlated with Exam Performance ($p < .01$). Overall Attitude towards Statistics, and its subscales are also significantly & positively correlated with Exam performance ($p < .01$)

Table 4. Multiple Regression Analysis of Learning Style (VARK) Predicting the Attitude towards Statistics and Exam Performance

Variable	Attitude towards course			Attitude towards Field			Attitude towards Statistics (Total)			Exam Performance		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
Visual	.27	.27	.12	.36	.47	.09	.54	.68	.097	.86	.57	.18
Aural	.23	.33	.08	.19	.56	.04	.48	.81	.07	.09	.67	.02
Read/Write	.67	.34	.24	.60	.58	.12	1.28	.84	.18	1.66	.70	.27*
Kinesthetic	.66	.30	.27*	1.45	.51	.34**	1.98	.74	.32**	1.44	.62	.27*
R ²	.191			.173			.186			.237		
F	3.551*			3.136*			3.433*			4.665**		

* $p < .05$ ** $p < .01$

Table 4 shows that Learning style accounted for 19.1% variance in Attitude towards Course, which is significant ($F(4, 60) = 3.551, p = .012$). Kinesthetic ($\beta = .27, t(63) = 2.216, p = .03$) is significant predictor of Attitude towards Course. For the variable of Attitude towards Field, Learning style accounted for 17.3% variance, which is significant ($F(4, 60) = 3.136, p = .021$). Kinesthetic ($\beta = .34, t(63) = 2.826, p = .006$) is significant predictor of Attitude towards Field. When we look at the total score on Attitude Towards Statistics, Learning style accounted for 18.6% variance, which is significant ($F(4, 60) = 3.433, p = .014$). Kinesthetic ($\beta = .32, t(63) = 2.661, p = .01$) is significant predictor of Attitude towards Statistics. Looking at the Exam Performance, Learning style accounted for 23.7% variance, which is significant ($F(4, 60) = 4.665, p = .002$). Read/Write ($\beta = .27, t(63) = 2.364, p = .021$) and Kinesthetic ($\beta = .27, t(63) = 2.332, p = .023$) are significant predictors of Exam Performance.

DISCUSSION

Everyone has different ways of learning and experiencing the world. The learning style of every person varies, but everyone learns through some common ways: through visual, aural, read/write and kinesthetic modalities. Each modality carries its own benefits and drawbacks, and individual may either use a single modality or a variety of modalities to carry out their learning.

This study was carried out to discover the impact of these different learning styles on the attitude of the students towards the subject of Statistics. The research aimed in trying to understand which of these learning styles better predicts the attitude towards statistics as well as exam performance in the subject. It was revealed that Kinesthetic mode of learning not only has a moderate positive correlation with the Attitude towards Statistics as a whole and with both of its sub-scales i.e., Attitude towards Course and Attitude towards Field, but it is also found to be a significant predictor of all these attitudes. Moreover, it was found that Exam performance is also significantly predicted by this style of learning, along with the Read/Write mode. Positive relationship of exam performance was seen with Visual mode too, together with these. Interestingly, no relationship or predictability was found with the Aural mode of learning.

The Kinesthetic aspect is very important in the study of Statistics, as learning here is practice based. So those students who prefer to use this modality, find it easier and therefore develop a better attitude towards this subject (both the field and the course), and in turn get to perform better in examinations too.

The course of statistics also includes the visual aspect, using graphs, pie charts, tables and flow charts, and the reading/writing, where students write down points they note from the diagrams and books. Aural learning, or learning through listening to lectures, does not seem to play a role in this subject. Learning styles are not only found necessary but also important for individuals in academic settings. According to Chuah Chong-Cheng (1988), most students choose particular ways to learn, which allows each style of learning to contribute to the success in retaining what they have learnt. Most students therefore retain 10% of what they read, 26% of what they hear, 30% of what they see, 50% of what they see and hear, 70% of what they say, and 90% of what they say as they do something (Chuah Chong-Cheng 1988). This was also seen in a study where learning preferences in nursing students was taken in accordance with the demographic background of each student. Results showed that the Kinesthetic learning modality was most dominant amongst the four (Visual, Aural, Read/Write, Kinesthetic) (James, D'Amore & Thomas, 2011). In a follow up to this study, another sample of nursing students in another country were also tested using the VARK standardized tool. It was seen that 68% of their sample preferred more than one modality in learning, without any influence of demographic background (Alkhasawneh et al, 2008). Furthermore, when taking into account preferred learning modalities it was seen that almost 40% of the students predominantly use a single mode of learning, the most of which are kinesthetic and the

60% of the sample prefer more than one mode of learning. In a study conducted on students getting a degree in Dentistry (Tantawi, 2009) it was seen that 73.7% of the Dental students prefer multimodal learning while less than 30% students had a single dominant preference. Moreover, it was also seen that most of the sample preferred Kinesthetic mode of learning across single learning preferences as compared to other learning modalities. Similarly, in another study, (Murphy et al., 2004) conducted to understand the different learning styles preferred by dental students and its relationship to age and gender, it was seen that 56% of the student sample preferred multimodal learning styles and 44% had single preferences.

Conclusion

Overall, from the findings of the present study, it is concluded that the kinesthetic mode of learning plays an important role in excelling the attitude as well as the skills in the area of statistics facilitating the research processes. However, the present study was limited in the sense that only students from a single teacher's class were studied. Also data size needs to be increased to get reliable results. In addition, homogeneity in gender needs to be created in order to study the effect of gender on learning styles as well their attitude in statistics.

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