

Learning Style Preferences of First Year Statistics Undergraduates

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Abstract

Everyone learns differently. Learning styles affect on students' level of performance in many different ways. It is important to assess the learning styles of students in order to cater for their different learning needs. The aim of this study was to determine the learning styles of first year statistics undergraduates and their relation to gender and academic performance. VARK instrument, which categorized learning preferences as visual(V), auditory(A), reading-writing(R), kinesthetic(K) was used to collect data. According to the VARK questionnaire, students were divided into four groups as visual learners, read-write learners, auditory learners and kinesthetic learners. Ward's hierarchical cluster analysis using binary distance was used to identify clusters, based on students' responses to thirteen questions in VARK questionnaire. Cluster analysis identified four groups of individuals with similar learning patterns. The repeated measures ANOVA was used to compare the mean level of performance across different learning styles: visual, aural, kinesthetic and read. According to the results of both VARK classification and cluster analysis it reveals that respondents in all the four clusters have not restricted to a single learning style. Respondents in cluster 1 are bimodal learners while cluster 4 respondents are tri mode learners. In both cluster 1 and cluster 2 the respondents are less sensitive to visual learning mode. The third and fourth clusters represent a more balanced profile with all the learning styles: aural, kinesthetic, read-write and visual. According to the multinomial logistic regression analysis these four clusters differed significantly with respect to their academic performance but the learning styles did not differ between male and female students. These results can be used to facilitate student learning. Moreover, students themselves can use this knowledge to identify their learning habits and that will be very helpful for them to adjust to the new learning environment effectively without wasting much time and energy.

Keywords: Learning Styles, Cluster Analysis, Binary Data, Repeated measures ANOVA

1. Introduction

Every individual has a different learning style. Learning styles affect on students' level of performance in many different ways [1]. It decides how information is received, process and stored in the brain and how effectively students attend and concentrate. First year students at universities face a challenging time during their first academic year as the learning methods used at university is somewhat different from what it used to be at school. Due to this students find it difficult to adopt this new learning environment and this affects their level of academic performance [2].

The main objective of this study was to identify the learning style preferences of first year statistics undergraduates and their relation to gender and academic performance. VARK instrument, which categorized learning preferences as visual (V), auditory (A), reading-writing (R) or kinesthetic (K) was used to collect data.

2. Materials and Methods

2.1 Data

The Visual, Aural, Read-Write, and Kinesthetic (VARK) questionnaire was distributed to the first year students mid of the first year first semester and the willing students (n=85) completed the VARK questionnaire.

2.2 Statistical Methods

Cluster analysis procedure was used to classify individuals on the basis of their response to

VARK questions. Ward's hierarchical cluster analysis using binary distance was used to identify clusters. Cluster analysis was performed by R statistical software. The vectors are regarded as binary bits, where non-zero elements are 'on' and zero elements are 'off'. The distance is the proportion of bits in which only one is on amongst those in which at least one is on. The repeated measure ANOVA was used to compare the mean level of performance across different learning styles: visual, aural, kinesthetic and read. Multinomial logistic regression was performed to assess the association between gender, academic performance in relation to their learning style cluster.

3. Results and Discussion

3.1 VARK classification

According to the VARK classification the most common learning preferences was aural followed by read-write. Cluster analysis based on response to 13 questions in VARK questionnaire identified 4 clusters of students. The cluster dendrogram resulting from hierarchical clustering is shown in Figure 1.

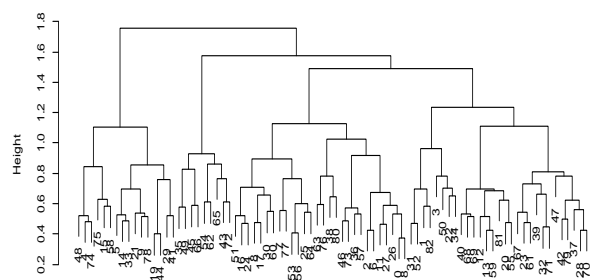


Figure 1 - Dendrogram of hierarchical cluster analysis

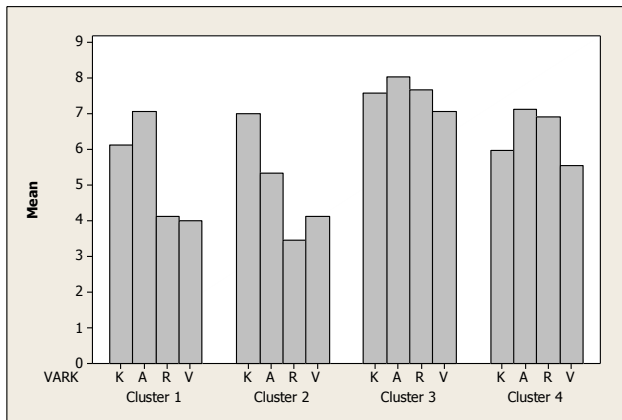


Figure 2 – Composition of the sample by VARK classification and the results of ward clusters

According to cluster analysis cluster 1 respondents were more focused on aural and kinesthetic learning styles. Respondents in cluster 2 emphasize with the ability to learn from active experience and applications but they are less focused on read-write and visual learning styles. The third cluster represents a more balanced profile with aural, kinesthetic, read-write and visual. In cluster 4 the most dominant learning styles are kinesthetic, aural and read- write. Aural and kinesthetic learning styles are the most dominant preference among all clusters. According to the multinomial logistic regression analysis these four clusters differed significantly with respect to their academic performance but the learning styles did not differ with respect to gender.

4. Conclusions and Recommendations

According to the results of both VARK classification and cluster analysis it reveals that respondents in all the four clusters have not restricted to a single learning style. Respondents

in cluster 1 are bimodal learners while cluster 4 respondents are tri mode learners. In both cluster 1 and cluster 2 the respondents are less sensitive to visual learning mode. The third and fourth clusters represent a more balanced profile with all the learning styles: aural, kinesthetic, read-write and visual. Clusters differed significantly with respect to their academic performance. For effective instruction, instructors need to broaden their range of presentation styles to help effective learning environment for all students.

References

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