

## Underlying Reasons for Different Learning Approaches in Statistics in Turkish Universities

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### Abstract

Statistics has been a required unit in many of the business and management related degrees in Turkish universities for many years. The research shows that deep approach to learning is ideal for retention and application of learnt concepts. In this study we investigated the learning approaches of students in statistics who are studying towards a management science or management engineering degree in six Turkish universities. We found some statistically significant relationships between the learning approaches of students and their demographics as well as significant differences of scores between the universities.

**Keywords:** Statistics education; engineering and statistics; deep approach to learning

### 1. Introduction

Statistical literacy and the application of statistical techniques to problems at hand have become important during the last couple of decades due to massive data collections made possible by technological advances. Many higher education degree programs have since included statistics courses in their curriculums to better prepare their graduates for the work environment, and enable them to deploy evidence based practices in their work. The degree to which graduates will be able to gain useful knowledge from the statistics courses they study is dependent on the learning approaches they utilise. The aim of this study was therefore to investigate students' learning approaches in statistics units, and relate these to background variables such as age, gender, study work load and their time at university. The results of this study might shed light into curriculum development in the future for such statistics units and enable students to choose deeper approaches to their learning.

### 2. Data Collection

A demographic survey (Bilgin et al 2013) and the Approaches and Study Skills Inventory for Students (ASSIST) survey tool (1998) are used for data collection after translating them into Turkish. We also had to modify the demographic survey to capture the differences between Australian and Turkish high school and tertiary education system differences.

We surveyed 458 students in Turkey to investigate the relationship between student characteristics and the learning approaches they utilise in the study of statistics. The students came from six Turkish universities, namely from the University of Afyon Kocatepe (n=29), University of Hacettepe (n=41), Karadeniz Technical University (KTU) (n=78), Technical University of Istanbul (ITU) (n=84), Selcuk University (n=198), and Yildiz Technical University (YTU) (n=28).

These six Turkish universities could be grouped into three categories based on the cohort of students they intake - which we surveyed. In Turkish university entrance exam, students are categorised into four groups based on what they study at high school. These categories are social sciences (SS), Turkish – Mathematics (TM), Mathematics and Science (MS), foreign languages (FL). Only one of the universities' students who we surveyed studied MS during their high school, this is Technical University of Istanbul which mainly offers Engineering degrees. Other five

universities' students needed to study TM during their high school. In addition, Afyon and Selcuk Universities are located in smaller Turkish cities and attract more local students than other four universities.

### 3, Results

The preliminary results of our analyses showed that there were statistically significant positive correlations between all three learning approaches; however the strength of the correlation for the deep and strategic approaches was three times higher than the correlations between deep and surface, and strategic and surface approaches. Students who completed high school in a city other than where their university was located had lower learning approaches scores for all three approaches, but only surface and strategic approach scores were statistically significant. The year at university and whether the student worked during the semester were negatively correlated with strategic learning approaches. The analysis also showed that when students stated that they liked studying, their deep and strategic approach scores were higher and surface approach scores lower. In addition, if they stated they liked studying mathematics in high school, students had statistically significantly higher deep approach scores. When students considered enrolling into a higher degree in the future, they had significantly higher deep approach scores, and when they did not consider the same option they had significantly higher surface approach scores. The perceived usefulness of statistics was negatively correlated with surface approach scores. Finally, students' expected grade for their statistics unit was highly related to their learning approaches; higher expected grades were associated with higher strategic approach scores and lower surface approach scores.

We found statistically significant difference between surface and strategic approaches scores of students in six universities, but no difference for deep approaches. ITU students had the lowest mean surface approach scores (47.7 with a standard deviation of 1.0) and they were significantly different from University of Afyon Kocatepe ( $p=0.02$ ), Karadeniz Technical University ( $p<0.001$ ) and Selcuk University ( $p<0.001$ ). Similarly ITU students had the lowest mean strategic approach scores (65.7 with a standard deviation of 1.3) and they were significantly different from University of Afyon Kocatepe ( $p=0.005$ ), Karadeniz Technical University ( $p<0.001$ ), Selcuk University ( $p<0.001$ ), and Hacettepe University ( $p=0.041$ ). Our future analysis will investigate underlying reasons for observed differences; however, we suspect that these differences might be due to the difference in the student intake used in different universities.

### References

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