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A Study of Subject Selection of Commerce Students Towards Statistics

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Abstract: *The purpose of this study is to measure the students' attitude towards statistics subject and effect of discovery of knowledge after the completion. It is necessary to define a certain type of research parameters, so we have chosen students from higher education who take statistics as a subject in post graduate students of South Gujarat region. We randomly sampled 100 students from the management college. Factor analysis has been used here to extract the factor that affects the decision of students for directly or indirectly. We referred such parameters such as Likeness, anxiety, interest, confidence, understanding, motivation, usefulness into real world, statistical jargon, worried about test result, not to interpret test result, peer group thinking, irrelevant, computer literacy and online open sources softwares like SPSS.*

Keywords: Factor analysis, Attitude, affective Parameters (Likeness, Anxiety, Interest, Confidence etc.

I. INTRODUCTION

The cognitive component, which refers to the mental process of perception, conceptions and beliefs about the attitudinal object, in this case, is pertaining to statistics subject. The affective or emotional component, which collects all those emotions and feelings that stimulate statistics, for example; those subjective reactions of trust and distrust, like and dislike, among others. The purpose of this study was to examine the various factors that approaches students to choose statistics subject. The goal was to determine how graduate student self-efficacy to learn statistics is predicted by statistics anxiety, attitude toward statistics, and social support. The overarching intent was to document graduate student self-efficacy to learn statistics and identify how certain variables influence statistics self-efficacy.

In this paper, we use a questionnaire about attitude towards statistics subject, which decomposes attitude into 13 factors, one affective and the other evaluative, both bi-dimensional in structure. In the affective subscale, one factor measures the degree of interest in the subject, and the other, the level of students' anxiety when tackling statistics problems.

II. LITERATURE REVIEW

Research on the subject of the attitude towards statistics have gained importance and interest since the seminal work of Wise (1985) and Aimed (1991; 1992) who measured attitude from an affective and cognitive point of view. Studies by Gil Flores (1999) and G´omez-Chac´on (2000) brought out within the definition given to these preponderant variables called "attitude" three basic factors, also called pedagogical components.

One of the first operative definition and measure about attitude toward statistics is the test of Roberts and Bildderbach (1980) denominated Statistics Attitudes Survey (SAS). It's considered the first measure about construct called "Attitude toward statistics" in fact, was made with the intention of providing a focused test in statistics field in order to measure this subject, from the tradition and professional work of students. In this order of ideas, some arguments exposed in Garcia-Santillán, Venegas-Martinez and Escalera-Chávez (2013) refers that, into the educational research, statistical level has justified the need to pay attention to students' attitude mainly because they have an important influence on the process of teaching and learning and the same way, the immediate academic performance (such as variable input and process).

In the same sense, the argument exposed by Auzmendi (1992), Gal & Ginsburg (1994) and Ginsburg & Schau (1997) about students' attitude toward statistic; they point out that, the attitude is an essential component of the background of student with which, after its university training, may carry out academic and professional activities (cited in Blanco 2008). Other research (Mondejar, Vargas and Bayot, 2008) developed a test based on the methodological principles of Wise (1985) attitude toward statistic (ATS) and scale attitude toward statistics (SATS) of Auzmendi (1992).

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About scale ATS, is structured of 29 items grouped in two scales, one that measures the affective relationship with learning and cognitive measures the perception of the student with the use of statistics. Mondéjar et al (2008) refer to that initially validation was based on a sample very small, and was with subsequent studies such as Mondejar et al (2009) or Woehlke (1991) who´s corroborated this structure, and the work of Gil (1999) choose to use an structure with five factors: one of the emotional factor and the remaining four factors related cognitive component. The objectives were to develop a test on students 'attitude statistic and his analyze on influence in the form to study. Mondéjar et al (2008) describe the psychometric properties of this new scale to measuring attitude toward statistics; the result obtained is the creation of a good tool to measuring or quantifying the students´ affective factors. Besides, the result may show the level of nervousness and anxiety and other factors: such a gender and how the course studied may affect the study process. All this could affect students´ attitude like say Phillips (1980), he refers to, that the students' attitude can suppose an obstacle or constituted and advantages for their learning.

III. Research Methodology

Research design refers to the framework of market research methods and techniques that are chosen by a researcher. The design that is chosen by the researchers allow them to utilize the methods that are suitable for the study and to set up their studies successfully in the future as well. The empirical study uses a sample of 100 students from the Veer Narmad South Gujarat University (Surat) enrolled in one of the Commerce College on a several factors of statistical content for the first time during their study tenure. Data were collected in the Mid Semester of classes, in order to ensure that the results were not biased by factors such as the progress of the Selection, the performance of the teacher, or the partial results obtained.

- **Research Design**: Descriptive Research Design
- **Data Types**: Primary Data
- **Sample Size**: 100 Students
- **Data Collection Tools**: Questionnaire
- **Factors under Study:** Likeness, Statistical Jargon, Unable to Interpret Result, Interest,
- Irrelevant, Complication about test result, Understanding, Confidence, Usefulness into real world, Statistical Packages, Computer Literacy, Motivation, Anxiety

A. Hypothesis:

- H0: Original Correlation matrix is an identity matrix (There is no relationship among item selected in the instrument)
- H1: Original Correlation matrix is NOT an identity matrix (There is relationship among item selected in the instrument)

Statistical Tools: Factor Analysis

B. Statistical Analysis

Exploratory Factor Analysis: Exploratory factor analyses performed on given 13 variables which are measured and taken on ratio data only. Few items were deleted whose communalities are less than 0.5 and then further run the factor reduction methodology. Moreover, Equamax rotation method applied to get the proper groupings of the variables. Following are the SPSS output and interpretations for factor analysis:

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.670
Bartlett's Test of Sphericity	Approx. Chi-Square	429.810
	Df	78
	Sig.	.000

The table shows the result of KMO (Kaiser-Meyer-Olkin) and Bartlett's Test. The KMO measures the sampling adequacy for carrying out the factor analysis. The value should be minimum 0.5 and preferably higher than that. For our study, KMO value is 0.670 which is much higher than the standard value. This is indeed good news for researcher to carry out factor analysis that sample is adequate enough.

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Bartlett's test of Sphericity tests the null hypothesis that the original correlation matrix is an identity matrix. For factor analysis, we observe the needs of some relationship between variables and if overall matrix were found to be identity then all correlation coefficients would be zero. For our study, Bartlett's test significance value is 0.000 which is less than 0.05. So we interpret that the value is significant and correlation matrix is not an identity matrix. So the factor analysis is appropriate and further analysis can be done.

Communalities

	Initial	Extraction
Likedness	1.000	.818
Anxiety	1.000	.847
Interest	1.000	.762
Confidence	1.000	.357
understanding	1.000	.540
Motivation	1.000	.766
usefulness into real world	1.000	.623
statistical jargon	1.000	.696
Complication about test result	1.000	.470
unable to interpret result	1.000	.820
Computer literacy	1.000	.623
statistical packages	1.000	.628
Irrelevant	1.000	.412

Extraction Method: Principal Component Analysis.

Communalities are defined as the proportion of each variable's variance which can be explained by the factors. Here communalities of each variable under the study is greater than 0.6 which indicates there exists good variance explanation power of each variable for the factors extracted.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.112	23.937	23.937	3.112	23.937	23.937	3.016	23.197	23.197
2	2.150	16.541	40.478	2.150	16.541	40.478	2.144	16.495	39.693
3	2.039	15.687	56.165	2.039	15.687	56.165	2.103	16.174	55.866
4	1.060	8.156	64.321	1.060	8.156	64.321	1.099	8.454	64.321
5	.990	7.619	71.940						
6	.859	6.611	78.551						
7	.682	5.245	83.796						
8	.529	4.069	87.865						
9	.490	3.768	91.633						
10	.357	2.750	94.383						
11	.314	2.417	96.800						
12	.245	1.881	98.681						
13	.171	1.319	100.000						

Extraction Method: Principal Component Analysis.

The table shows the result of total variance explained by all extracted factors by using Principal Component Analysis (PCA). The study analyzed the rotated sums of square loadings with greater than 1 and even closer to 1 eigen value. Next column represents variance in % term for each factor and their cumulative values. So our result indicates that 1st factor explains 23.97% of variance in dependent variable. 2nd factor explains 39.69 % and so on…

Together all 4 factors explain 64.321 % of variance explained on dependent variables. So overall performance of the banking factors explained by 64.321 % through 4 major determinants on Statistics Subject Selection in Commerce Colleges.

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Rotated Component Matrix[a]

	Component			
	1	2	3	4
Likedness	-.844	.316		
statistical jargon	.819		.128	
unable to interpret result	.794	.320	-.119	.272
Interest	-.771	.389		
Irrelevant	-.531	-.331		-.143
Complication about test result		-.676		
Understanding	-.122	.670		-.264
Confidence		-.578		-.138
usefulness into real world		.204	.758	
statistical packages	.210	-.126	.753	
Computer literacy	.132	-.236	-.708	-.218
Motivation	.199	.564	-.637	
Anxiety		-.103		.911

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.[a]
a. Rotation converged in 5 iterations.

Table shows the rotated component matrix where 4 major factors are extracted which has strong explaining power for independent variable. However, all these four factors may named by researchers as per the items grouped in each component. All values in the tables represent the factor loading which means the relationship between items and factor. So if the value of factor loading high, there is high correlation between item and factor.

IV. Finding and Conclusion

In this paper, we have evaluated the questionnaire designed to assess students' attitudes towards statistics Subject. The questionnaire has 13 factors, an affective and other evaluative. In all cases, KMO value is 0.670 which is much higher than the standard value. This is indeed good news for researcher to carry out factor analysis that sampleis adequate enough that the obtained factor structure is appropriate: the four empirical scales are significant, monotonous and consist of items that are added unidimensionally. Thus, the estimate scales can be used as a substitute for latent scales in the study of affective and evaluative components that influence students' attitudes towards statistics.

Globally, the results confirm a model that can offer guidance about how educators can recognize students' level of selection with respect to statistics subject. Specifically, if educators can familiarize their students about the social applications of statistics, this should reinforce their perception of the utility of this discipline for their current studies and increase their interest in studying the subject. These effects should indirectly translate into a reduction in the students' level of anxiety. Likewise, efforts to directly boost students' interest in statistics or their perception of its utility in their current studies should also reduce their level of anxiety.

Efforts to reduce the level of anxiety-nervousness should lead to improved academic performance in statistics among students, so this model could help educators design strategies to do this, or provide a means of evaluating the effectiveness of such strategies

Bibliography

[1]. Auzmendi, E. (1992). Las actitudes hacia la matemática-estadística en las enseñanzas medias y universitarias. Bilbao: Mensajero.

[2]. Bayot, A.; Mondéjar, J.; Mondéjar, J.A.; Monsalve, F. and Vargas, M. (2005). The Difficulties of Learning Concepts in the Social Sciences. In Misztal, M. and M. Trawinski (eds.) Studies in Teacher Education: Psichopedagogy, 242-258. Kraków: Wydawnictwo Naukowe Akademii Pedagogicznej.

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[3]. Beins, B.C. (1985). Teaching the relevance of statistics trough consumer-oriented research. Teaching of Psychology, 12, 168-169.

[4]. Carmona, J. (2004). Una revisión de las evidencias de fiabilidad y validez de los cuestionarios de actitudes y ansiedad hacia la estadística. Statistics Education Research Journal, 3(1), 5-28.

[5]. Darias, E. (2000). Escala de actitudes hacia la estadística. Psicothema, 12 (2), 175-178.

[6]. DeVellis, R. F. (2003). Scale development: Theory and applications, Second edition. Thousand Oaks, CA: Sage Publications.

[7]. Elosua, P. (2006). Modelo de doble monotonía fuerte para ítems politómicos aplicado a una escala de autoconcepto social. Propiedades formales y métricas. Revista electrónica de metodología aplicada, 11(1), 1-15.

[8]. Gil, J. (1999). Actitudes hacia la estadística. Incidencia de las variables sexo y formación previa. Revista española de pedagogía, LVII, 214, 567-590.

[9]. Junker, B. W. and Sijtsma, K. (2000). Latent and Manifest Monotonicity. Applied Psychological Measurement, 24, 65-81.

[10]. Katz, B. M. and Tomazic, T. Z. (1988). Changing student's attitudes toward statistics through a nonquantitative approach. Psichological Reports, 62, 658.

[11]. Mokken, R. J. (1971).