

Scholastic Achievement of Higher Secondary Students in Science Stream

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Abstract: The present study was conducted on 400 students (200 boys and 200 Girls) selected from senior secondary school of A.M.U., Aligarh-India, to establish the prognostic value of different measures of cognition, personality and demographic variables for success at higher secondary level in science stream. The scores obtained on different variables were factor-analyzed to get a smaller number of meaningful variables or factors to establish the predictive validity of these predictors. Factors responsible for success in science stream were identified. The prognostic value of the predictors was compared for high achievers and low achievers in order to identify the factors which differentiate them.

Key words: Prognostic Value, Cognition, Personality and Demographic Variables, Correlation Matrix, Factor Analysis

INTRODUCTION

After independence, the pattern of the higher secondary education in India was influenced by the recommendations of University Education Commission [3], which regarded higher secondary education as very important, because it was the foundation of university education. Secondary Education Commission [4] made valuable suggestions for the improvement and re-organization of secondary education and recommended the diversification of courses to meet varying aptitudes, interests and talents of the learners. The different states of India, therefore, introduced diversified courses at the secondary stage of education. The Education Commission [5] recommended introduction of uniform structure of school and college education throughout the country. It also pointed out that secondary education is a complete unit by itself and that at the end of this stage the student should be in a position to, if he wishes, take up some useful vocation. Prior to the implementation of 10+2+3 scheme of school and college education, diversification of courses started from class IX i.e. approximately at the age of 14⁺. The students at this age are not mature enough to take such an important decision. Moreover, their talents and aptitudes are not likely to have crystallized fully at this age to enable them to take a judicious decision in this regard. In this regard, Kulshrestha [9] stated that the enlarged curriculum might create confusion in the mind of an immature child studying in class VIII, who is still young. Regarding the scheme of diversification of courses, Education Commission [5] stated that one of the major weaknesses in the scheme is that specialization of studies begins too early.... The streaming of pupils in this way is undesirable. The Commission further suggested that secondary schools should admit the best students. At the higher secondary stage, the selections for admission have to be more rigorous. It is, therefore, imperative that only those

students should be admitted to science stream that possess the cognitive, affective and other characteristics necessary for success at this stage. An attempt was made by British Journal of Educational Psychology to organize a number of symposia for discussing the importance and procedure of selection of students for admission to different streams of secondary education. A number of eminent psychologists and educationists participated in the deliberations and contributed research studies in that regard. The general agreement is that streaming and diversification of courses should be introduced at the age of 16⁺, when students have acquired necessary general education at least for 10 years.

Objectives

In specific terms, the present study seeks to:
Investigate prognostic value of certain cognitive, non-cognitive and demographic variables, which are listed below:

- * Cognitive variables: Intelligence (verbal and non-verbal) and Creativity;
- * Non-Cognitive variables: Personality and Achievement Motivation;
- * Demographic variables: Socio-economic status.

Factor analyze the inter-correlation matrix of different predictor variables and the criterion of success i.e. Achievement in science at the Higher Secondary level.

MATERIALS AND METHODS

The tests of predictor measures were administered to 400 students (200 boys and 200 girls) studying at the higher secondary stage in the Senior Secondary School of Aligarh Muslim University, Aligarh-India, using the Cluster Sampling Technique. In all the study involved five predictor variables and one criterion variable.

Predictor measure

- * Intelligence: Mehrotra's Mixed Type Group Test of Intelligence.
Verbal: Reliability 0.91; Non-verbal: Reliability 0.81.
- * Creativity: Creativity Test based on Guilford's Structure of Intellect Model.
Reliability 0.68.
- * Personality Variables: Personality Inventory by Rani. Reliability 0.73 to 0.96.
- * Achievement Motivation: Bhargava's Achievement Motivation Test. Reliability 0.79.
- * Socio-economic Status: Socio-economic status Scale by Srivastava. Reliability 0.94.

Criterion Measure: Achievement: The marks obtained by the students at the senior secondary examination in science stream conducted by Aligarh Muslim University, Aligarh-India.

Statistical Treatment and Analysis of Data: As evident from the details given above, each subject in the sample had scores on each of the predictors and criterion measures. These scores were inter-correlated employing *Pearson's Product Moment Correlation Coefficient*. The inter-correlation matrix so obtained was factor analyzed in order to arrive at smaller number of variables suitable for predicting academic success of students in science stream. Factors obtained were interpreted in the light of connotations of variables getting high loading on different factors. The distributions of scores on all variables were checked for normality or even symmetry. The facility of a computer was employed to compute coefficient of correlation and conduct factor analysis. Factors and their loadings were obtained for total sample of students (N = 400), for total students who simply passed (N = 165), for total students who passed in First Division (N = 164), boys who passed in First Division (N = 87) and the girls who passed in First Division (N = 77) respectively.

RESULTS

The students who had secured between 33 and 59% marks were labeled as low achievers and those who secured more than 60% marks were called high achievers. The factors and their loadings were interpreted as follows:

- * The combined sample of boys and girls yielded seven factors. It was concluded that the students in the sample are conscientious, venturesome, kind, stable, reserved, trusting, persevering, lively, cooperative, possessing high intelligence and are fairly high on academic achievement.
- * The scores of low achievers (boys and girls) yielded six factors. The factors obtained by the low achievers reveal that such students are lively,

reserved, impulsive, fickle-minded, nervous, submissive, conscientious, trusting, experimenting and harsh. They also have achievement motivation, verbal and non-verbal intelligence, divergent thinking and high socio-economic status.

- * The factor analysis of scores of high achievers (boys and girls) indicated that they are reserved, trusting, submissive, venturesome, conscientious, conservative, kind, stable, lively, confident, co-operative and persevering. They also have non-verbal intelligence, divergent thinking, achievement motivation and high socio-economic status.
- * An examination of the factors obtained for high achiever boys revealed that such boys are reserved, submissive, expedient, suspicious, fickle-minded, lively, nervous, co-operative, shy, impulsive, conservative and harsh. They also have non-verbal intelligence and high socio-economic status.
- * The loadings of factors obtained for high achiever girls revealed that for high achievement, girls require the following characteristics: Venturesome, persevering, submissive, reserved, serious, co-operative, experimenting, expedient, harsh, nervous, impulsive and trusting. They also have non-verbal intelligence and socio-economic status, but lack divergent thinking.

DISCUSSION

The present study seeks to establish the prognostic value of different measures of cognition, personality and demographic variables for success at higher secondary level in science stream. A comparison of boys and girls in the total sample (low achievers and high achievers) reveals:

- * That high achievers are stable, conservative and dominant but the low achievers are shy, impulsive and harsh. Stability and dominance are important characteristics of a person who is likely to be methodically engaged in his studies, which may result in high achievement. This conclusion also finds support by Jahan [8], Haq [7] and Khan [12]. On the contrary, low achievers are impulsive i.e. they are uneasy, affected by feelings, impatient-excitabile and act on the spur of the moment. Therefore, they are slip shod in their studies and hence are shy as well as harsh (Khan [14]).
- * That low achievers are fickle-minded, expedient and submissive, but the high achievers are persevering, conscientious and venturesome. This shows that perseverance, conscientiousness and venturesome behavior tend to help in high achievement. It is also quite logical that a person who is able to take risk and is hard working and conscientious will secure higher marks at any examination than the one who is fickle-minded,

expedient and submissive. Similar results reported by other researchers (Neog [1]; Jahan [8] and Khan [12]).

- * That a high achiever is reserved, serious and trusting in nature, which traits seems to help in high achievement. The reserved-ness and seriousness lead to high achievement in science, because a person with their traits is able to devote sufficient time to his studies, without interference of his peers, but it is essential for high achievement that the person should not possess nervous temperament. The low achievers are sociable, suspicious and lively. All these characteristics lead to low achievement, which is perhaps due to the carefree nature of the students in this group (Srivastava [2]).
- * That a high achieving student is co-operative, kind and possesses sufficiently high level of verbal intelligence, but the low achieving students are deficient in verbal intelligence. Thus, verbal intelligence is a very important variable for selecting students for science courses at this level. If high verbal intelligence is also coupled with achievement motivation, it should lead to very high achievement. Lalithamma [6] and Khan [12] also support this finding.

A comparison of the factors and their loadings for identifying the sex differences between high achieving boys and high achieving girls reveals:

- * That in the case of girls, socio-economic status is positively related to academic achievement in science stream at higher secondary level, but the relationship between socio-economic status and academic achievement is significant and negative in the case of boys.
- * That the academic achievement of a student is not only a function of his/her intellectual and personal characteristics but is also influenced by his/her socio-economic status and which in turn, also influences and determines the attitudes, interests and motivation of students for studies. Thus, socio-economic status of a family is an important variable determining the academic achievement of its students.
- * That the effect of socio-economic status on academic achievement has shown sex differences in the present study. Boys from low socio-economic status and the girls from high socio-economic status have been found to achieve high. A review of researches in this area has not indicated sex differences regarding relationship between these variables.

The present research has come out with sex-differences regarding high achievement in science stream at higher

secondary level. The high achieving boys have been found impulsive, suspicious, shy, fickle-minded, conservative and dominant, but the high achieving girls have been found stable, trusting, venturesome, persevering, experimenting and submissive. These conclusions do not find support in the related research literature except by Khan [12] who mentioned the characteristics of the high achieving girls at the higher secondary stage. The related literature has not categorically mentioned the characteristics of high achieving boys or girls separately. However, the previous researches have shown that high achievers are stable (Jahan [8], Haq [7] and Khan [13]), impulsive (Neog [1], Rani [10] and Khan [14]). Khan [12] supported the present finding of personality-dimension of trusting. He found that high achievers possess trusting behavior. But, Neog [1] found that high achievers are of suspicious nature. Neog [1] found high achievers in Mathematics to be apprehensive. It is also important to see that high achieving boys are shy and fickle-minded, but high achieving girls are persevering and venturesome. The present research has, thus, come out with clear sex-differences with regard to some dimensions of personality i.e. persevering, fickle-minded, venturesome, shy, conservative, experimenting, dominant, submissive, impulsive, stable, suspicious and trusting. Some researchers have found that high achievers are persevering. On the contrary, Khan [12] found that high achievers are submissive. Studies of Datta [11] reveal that high achievers are conscientious, but Rani [10] and Khan [14] found that high achieving engineering students were expedient. In conclusion, the present research has come out with the following sex-differences regarding high achieving boys and girls:-

- * High achieving Boys are impulsive, suspicious, shy, fickle-minded, conservative, dominant and belong to low socio-economic status.
- * High achieving girls are stable, trusting, venturesome, persevering, experimenting, submissive and belong to high socio-economic status.

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