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APTITUDE AND ACADEMIC PERFORMANCE OF ADOLESCENTS

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ABSTRACT

Present study explores the abstract and verbal reasoning (aptitude) among science and arts students. It is aimed to find out the difference between science and arts students in terms of abstract and verbal reasoning, and academic performance. A sample of 84 (42 each from science and arts group stream) students has been taken from a government school of Tehri-Garhwal (Uttrakhand-India). Data is collected by administering Differential Aptitude Test (DAT). It is examined through the significance of the difference between means. Results show that there is found significant difference between science and arts students in terms of abstract and verbal reasoning (DAT). No significant difference is found in terms of academic performance among students. It is concluded that there can be important role of abstract and verbal reasoning among science and arts students for their aptitude but not for academic performance.

Key words: Abstract reasoning, verbal reasoning, aptitude, academic performance

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In psychology there are many methods of measuring human abilities. In which the measurement of intelligence and aptitude is very commonly used in judging the ability of any human being. Aptitude is commonly used term in the field of vocational psychology. It is an important aspect of psychological measurements for individual differences for suitability of any occupation. Aptitude is a person's capacity or hypothetical potential for acquisition of certain more or less well defined patterns of behaviour involved in the performance of a task with respect to which the individual has had little or no previous training. The capacity to acquire proficiency with a given amount of training formal or informal. In other words a combination of characteristics indicative of an individual capacity to acquire (with training) some specific knowledge skill or set of organized responses such as the ability to speak a language to become a musician to do mechanical work. An aptitude test therefore is one designed to measure a person's potential ability in an activity in of a specialized kind and within a restricted range.

It was a recognized fact in early societies as well present that individuals differed in respect of their capacities, skills etc. In ancient India this knowledge was used as in modern times for the placement of the individuals to job's appropriate for the degree of the skills on hand. Differential Aptitude Test (DAT) is used in the present study. it is popularly known as a multi-factor test battery of eight aptitude tests. These are: 1. Verbal Reasoning (VR). 2. Abstract Reasoning (AR). 3. Space Reasoning (SR). 4. Numerical Ability (NA). 5. Clerical Speed and Accuracy (CSA). 6. Mechanical Reasoning (MR). 7. Language Usage- Spelling (LU-sp) and 8. Language Usage-Grammar (LU-gr). In the present study researcher has applied only two tests which are described as follows:-

Verbal Reasoning: This is the test of verbal comprehension and is a "measure of ability to understand concepts framed in words. This test employs analogy type items in which two words, the first and the last, are to be filled in from the 5 pairs given as the alternate responses. The items are universal and have been drawn from different areas of knowledge, e.g. geography, history, politics, science etc. The analogy type items is particularly useful as a measure of reasoning ability. In most of verbal intelligence tests this is an important item: in fact, the situation presented in this test brings into play complex intellectual processes. This type of items stimulates one to seek and to know further and to "reduce relations," which is one of the three

neo genetic laws of Spearman according to which the mind "creates new mental content." The analogy type items have been the most fundamental in intelligence in one way or other. The VR of thus designed to predict success in areas where complex verbal relationship and concepts are important. Besides success in the academic courses, this may also indicate, certain aspects of the level, since there is positive relationship in many occupations between the level of responsibility of a job and complexity of verbally phrased items to be comprehended.

Abstract Reasoning: This is a non verbal measure of the reasoning ability and like verbal reasoning (VR) is fundamental to the ability of general intelligence. The general reasoning process is not much different from that of the VR but in this case the pupil is not handicapped by the lack of proper knowledge of the English language. The student has to perceive relations and has to think in abstract symbols. Difficulty level as also the conceptual complexity increased gradually. "The differences are apparent: discerning why the patterns differ is the intellectual exercise."

Academic achievement is defined by two terms. Academic pertains to school subjects or to fields of liberal arts or to the sphere of ideas and abstraction, while achievement is denoted by knowledge attained or skills developed by pupils usually in the schools, measured by test scores or by marks assigned by teachers (Chaudhary, 2004). In other words an academic achievement is defined as knowledge acquired and skills developed in school subjects, generally indicated by marks obtained in tests in an annual examination. Achievement is the glittering crown which reflects a sense of sincerity, candidness and perseverance on the part of achievers and also parents, teachers and all those helping to achieve it, and thus a result of bidirectional results. Achievement behaviour may be defined as any action directed of gaining approval where public standards of excellence are applicable. Crow and Crow (1969), defined academic achievement as the extent to which a learner is profiting from instructions in a given area of learning i.e., achievement is reflected by the extent to which skill or knowledge has been imparted to him.

Present study is primarily concern with abstract and verbal reasoning, and academic performance of the students. The purpose of this study is to find out the difference between science and arts students in terms of abstract and verbal reasoning, and academic performance among students.

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Review of Literature

There are some of the research studies which are related to the present study.

Maureen (2006) investigated the incremental validity of Big Five personality traits for predicting academic criteria (college GPA, course performance) while controlling for academic ability (SAT). Results showed that conscientiousness incrementally predicted each criterion over SAT. Results also showed that behaviour (attendance) incrementally predicted GPA and course performance and it mediated the relationship between conscientiousness and both academic criteria. Personality measures are promising predictors of academic outcomes and they may have usefulness in admissions and student development.

Heaven and Ciarrochi (2008) assessed whether perceived parental style influenced the extent to which adolescents became increasingly conscientious and whether changes in conscientiousness influenced academic grades 1 year later. Parental styles, conscientiousness, verbal, and numerical ability at Time 1 were measured. One year later conscientiousness was again assessed, and 1 year after that end-of-year exam results were obtained. More than 784 students (mean age = 12.3 years, SD = 0.49) participated in the 1st year. The data of 563 students were matched across the 3 years. Conscientiousness tended to decrease from Time 1 to Time 2. Structural equation modeling showed that adolescents with more authoritative parents experienced less of a decrease in conscientiousness at Time 2 than did students with less authoritative parents and the same baseline level of conscientiousness at Time 1. Additionally, the decrease in conscientiousness at Time 2 predicted worse grades at Time 3, even after controlling for baseline levels of academic achievement.

Owensa, et al. (2008) investigated whether associations between anxiety and educational achievement were mediated via poor working memory performance. Fifty children aged 11–12 years completed verbal (backwards digit span; tapping the phonological store/central executive) and spatial (Corsi blocks; tapping the visuospatial sketchpad/central executive) working memory tasks. Trait anxiety was measured using the State–Trait Anxiety Inventory for Children. Academic performance was assessed using school administered tests of reasoning (Cognitive

Abilities Test) and attainment (Standard Assessment Tests). The results showed that the association between trait anxiety and academic performance was significantly mediated by verbal working memory for three of the six academic performance measures (math, quantitative and non-verbal reasoning). Spatial working memory did not significantly mediate the relationship between trait anxiety and academic performance. On average verbal working memory accounted for 51% of the association between trait anxiety and academic performance, while spatial working memory only accounted for 9%. The findings indicate that PET is a useful framework to assess the impact of children's anxiety on educational achievement.

Newton and Moore (2009) studied to describe the relationships among scholastic aptitude, nursing aptitude, BSN student attrition prior to the final semester of the curriculum, and Bachelor of Science in Nursing (BSN) student readiness for the National Council Licensure Examination-Registered Nurse (NCLEX-RN). This study's findings, along with other findings in the literature, suggest the need for a parsimonious explanatory model of BSN student attrition that can be used to guide admission and progression policies, and ensure that students ready for the NCLEX-RN are the ones graduating from BSN programs.

Jonathan, et al. (2009) evaluated the motivated strategies for learning questionnaire for predicting academic performance in college students of varying scholastic aptitude. All 15 subscales of the Motivated Strategies for Learning Questionnaire (Pintrich, Smith, Garcia, and McKeachie, 1993) were administered to 352 undergraduate students taking Introductory Psychology. Their scores were evaluated with respect to incremental validity (in addition to ACT scores) they provided for predicting course grades. Results indicated that only two of the subscales, Self-efficacy, and Time and Study Environment, contributed incremental validity. When the students were disaggregated by ACT composite, and the low, medium, and high ACT groups were evaluated separately, Self-Efficacy dropped out of the model for the low ACT group, and only time and study environment provided incremental validity.

Sheard, (2009) examined hardiness commitment, gender, and age differentiate university academic performance. Sample data are reported from a total of 134 university undergraduate students. The results showed that mature-age students achieved higher final degree GPA (grade

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point average) compared to young undergraduates. Female students significantly outperformed their male counterparts in each measured academic assessment criteria. Female students also reported a significantly higher mean score on hardiness commitment compared to male students. Commitment was the most significant positive correlate of academic achievement. Final degree GPA and dissertation mark were significantly predicted by commitment, and commitment and gender, respectively.

Richardson and Bond (2012) explored psychological correlates of university students' academic performance: A systematic review and meta-analysis. Univariate analyses revealed that demographic and psychosocial contextual factors generated, at best, small correlations with grade point average (GPA). Medium-sized correlations were observed for high school GPA, SAT, ACT, and A level scores. Three non-intellective constructs also showed medium-sized correlations with GPA: academic self-efficacy, grade goal, and effort regulation. A large correlation was observed for performance self-efficacy, which was the strongest correlate (of 50 measures) followed by high school GPA, ACT, and grade goal. Implications for future research, student assessment, and intervention design are discussed.

Objectives: There are following objective of the present study
1. To find out the difference between science and arts students in terms of verbal reasoning.
2. To find out the difference between science and arts students in terms of abstract reasoning.
3. To find out the difference between science and arts students in terms of academic performance.

Hypotheses: Following null hypotheses are formulated for the present study
1. There would be no significant difference between science and arts students in terms of verbal reasoning.
2. There would be no significant difference between science and arts students in terms of abstract reasoning.
3. There would be no significant difference between science and arts students in terms of academic performance.

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RESEARCH METHODOLOGY

Sample: The total sample is consisted of 84 intermediate students of both sexes from government school of Tehri Garhwal (Uttrakahand-India). The age range of the student is 15 to 17 years.

Tools: There are following two sub-test of differential aptitude test (DAT) have been administered for the collection of the data. This DAT is developed by Ojha.

1. Abstract Reasoning questionnaire of Differential Aptitude Test: The test has 50 items, each consisting of 4 problem figures which depicts a relation between the first four shapes and the student is asked to locate, the correct shape from among the five given as 'answer figures' which will fit in the fifth shape of the problem figures. The ability is an important one for general intelligence as well as also for vocations or school courses or for several occupations which demand such perception of relationships in symbols. The time limit is 25 minutes. Scoring is done by laying perforated stencils over the marked answer sheet. Its reliability is 0.82 to 0.91 and validity 0.84 to 0.93.

2. Verbal Reasoning questionnaire of Differential Aptitude Test: This test consists of 50 such items each in the form of sentence of which the first and the last words are blank but are to be found from among the five alternate pairs given. Form A also presented the same types of items but there were 16 possible combinations. The time limit for the original test is 30 minutes. Scoring is done by laying perforated stencils over the marked answer sheet. Its reliability is 0.82 to 0.91.

Statistical Analysis: Significance of the difference (t-test) has been used in the present study for statistical analysis of the data.

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RESULTS

Findings of the study are described according to the objectives and hypotheses of the study. It begins with Table No.1 which hypothesized that there would be no difference between science and arts students in terms of verbal reasoning.

Table No. 1: Showing the Difference between Science and Arts Students in terms of Verbal Reasoning.

Group of students	N	Mean	SD	t-value
Science Students	42	26.33	5.14	
Art Students	42	21.71	8.13	3.12**

**Highly Significant

Table No. 1 shows that the mean of the science and arts students is found 26.33 and 21.71 respectively of verbal reasoning. The SD is found 5.14 of science students and 8.13 of arts students. So obviously this lead to a difference which is significant at 0.01 level. Therefore it can be inferred from the above statistical analysis that there is significant difference between science and arts students in terms of verbal reasoning and in which science students have more mean than arts students. Thus it can be said that science students may have more verbal ability than arts students. So the hypothesis is rejected.

Table No. 2: Showing the Difference between Science and Arts Students in terms of Abstract Reasoning.

Group of students	N	Mean	SD	t-value
Science Students	42	21.05	7.98	
Art Students	42	12.86	6.19	5.25**

**Highly Significant

It is hypothesized in Table No. 2 that there would be no difference between science and arts students in terms of abstract reasoning. The results of Table No. 2 states that the mean and SD of science and arts group is found 21.05 and 7.98 (Mean) for science students and 12.86 and 6.19 (SD) for arts students. This difference led to the t-value 5.25 which is significant at 0.01 level. On this basis hypothesis is rejected. It can be estimated that there may exist difference between science and arts students in terms of abstract reasoning.

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Table No. 3: Showing the Difference between Science and Arts Students in terms of Academic Performance.

Group of students	N	Mean	SD	t-value
Science Students	42	131.79	48.88	.89#
Art Students	42	124.48	22.53	

**Highly Significant

As Table No. 3 show the difference between science and arts students in terms of academic performance. The mean of science students is 131.79 and arts students 124.48. This mean leads to SD of arts and science students 48.88 and 22.53 respectively. On that basis t-value is found 0.89 which is not significant. So the hypothesis is accepted. Therefore it may be inferred that there could be no difference between arts and science students in terms of academic performance.

DISCUSSION

1. Verbal reasoning of students: As it is revealed in the results of Table No.1 that there can be significant difference between science and arts students in terms of verbal reasoning. In which science students have scored more (mean value) than arts students. Which shows that science students can have more verbal reasoning ability than arts. This finding suggests that science stream students could have better verbal skills due to their subject like physics, chemistry and mathematics which emphasizes more on presentation of thought related to science oriented subject into easily understandable language than arts students. For arts students could be little in this aspect due to having literary subject which does not demand that much translation of their expression.

2. Abstract reasoning of students: Abstract reasoning is the ability to think abstractly. This is shown in Table No. 2, which clearly suggests that there would be significant difference between science and arts students in terms abstract reasoning. In this again science students outperformed arts student which means that science students have higher level of abstract reasoning than arts students. This could be the influence of their science stream subject due to its more logical nature

like physics, chemistry and mathematics. On the other hand arts students having more of literary subjects like history, sociology, etc.

3. Academic performance of students: For academic performance among students, it is not found any significant difference between science and arts students. In this case both groups have performed such in academic performance which does not make any difference statistically. This might be due individuals' hard work and interest in their respective streams. In other words, there might not be any influence of aptitude on academic performance.

CONCLUSION

At last it can be said that though science and arts students differ in their aptitude level (verbal and abstract reasoning) even if it does not matter for academic performance. So it can be concluded that there could be significant difference between science and arts students in terms of aptitude level but it does not assure that it will also influence academic performance of the students. In other words, in can be said that there is no relationship between aptitude level and academic performance of the students.

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