

## Testing aptitude of business students: A multilevel retrospective analysis

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### ABSTRACT

Peer pressure and flow with the trend are major factors in choosing specializations. More often than not, students give less importance to aptitude while taking the leap into the practical world. The present study explores the aptitude of students at various levels in a higher educational institution in Oman. A mix of 444 students were tested in six major areas in three cohorts during 2017 – 2018 and their responses were collected and analysed. The findings signify that there is relationship between the level of students and the skills they have acquired in the different domains tested.

### Introduction

Over the years, aptitude tests have emerged as standard test for assessing an individual's inherent ability to perform specific tasks or natural flair for acquiring particular skill sets. These tests are quite common in the area of education, career placement, and recruitment processes to evaluate a person's potential for success in various fields or roles (Macklem, 2019). Aptitude test results are often used as one of several factors in making decisions. For example, in education, they can help determine grade placement or eligibility for advanced programs. In the workplace, they can assist in selecting candidates for specific roles or identifying training needs for current employees. These Aptitude Tests are used for educational placement (e.g., determining the appropriate grade level for students), career selection (helping individuals identify suitable professions), employee recruitment (assessing job applicants' potential for success in a specific role), and career development (identifying areas for skill improvement).

### Literature Review:

A multitude of studies have been conducted in the area of aptitude tests and their ability to predict academic performance. Setiawati (2020) studied the predictive validity of differential aptitude tests in predicting academic success in the context of psychology study programs at Yogyakarta State University, Indonesia. The study aimed at finding specific subtests, which were influential in predicting the success of students. The sample for the study comprised 148 students majoring in psychology at the University. For measuring the aptitude, Differential Aptitude Test (DAT) was used. The study found that not only DAT tests can predict the success of students in the study of psychology but also found that the subtest in DAT had the most influence in predicting the success of the study in psychology study program.

Similarly, a study by Siegenthaler (2011) tried to identify the predictability of standardised aptitude tests on the training success of apprentices in Switzerland. The study did not find relationship between aptitude tests and the performance of students, ability of firms to predict the unexcused absence of students from schools during apprenticeship and likelihood of premature termination. A study by Vera and Cortes (2021) explored predictors for academic performance among Ecuadorian students. The study covered seven variables as predictors of academic performance: verbal aptitude, numerical aptitude, abstract reasoning, emotional regulation scenarios, emotional regulation self-questionnaire, and academic performance.

The study identified past academic performance as the strongest predictor of future academic performance followed by gender, numerical aptitude, scenarios, verbal aptitude, abstract reasoning, and, finally, the emotional regulation self-questionnaire. Another study on Argentinian sample conducted by Corengia *et.al* (2011) analysed the relationship between educational aptitude and academic performance as well as attrition of students. Differential Aptitude Test (DAT) was used on 1530 first year undergraduate students of a private Argentinian university. Multiple and logistic regression models were used for analysis. The study found moderate to low relationship between DAT scores and academic performance as well as dropout rates.

Bird (2010) in his study on Puerto Rican students using Group assessment of logical thinking (GALT), tested the relationship between performance in General Chemistry exam and logical thinking as a predictor. The study found logical reasoning to be a predictor of academic performance. The study concluded that the logical reasoning skills are necessary component for students' mastery of concepts in Chemistry and more complex problem solving strategies required to succeed in general chemistry.

### **Business Aptitude Skills**

The aptitude test used in the present study comprised of the following components viz; language skill, mathematical skill, logical reasoning, knowledge of common subjects, mental ability, and general knowledge of the students.

### **Language Skill**

Language skills refer to an individual's ability to comprehend, produce, and manipulate language effectively. These skills typically encompass various components, such as listening, speaking, reading, and writing. Proficiency in language skills is crucial for effective communication and successful interaction within a given linguistic context. Assessing language skills involves evaluating a person's competence in these different dimensions such as; listening skills, speaking skills, reading skills and writing skills. Listening skills involve the ability to understand spoken language. Individuals with strong listening skills can comprehend conversations, lectures, and other auditory stimuli effectively (Goh, 2002). Speaking skills encompass the ability to articulate thoughts and ideas coherently. This includes pronunciation, fluency, and vocabulary usage (Richards & Renandya, 2002). Reading skills involve the capacity to understand written text. This includes the ability to decode words, comprehend meaning, and infer information from the text (Grabe, 2009). Writing skills refer to the capability to express thoughts and ideas in a written form. This includes grammar, vocabulary, organization, and overall writing proficiency (Hyland, 2003).

Language skills can be measured using different approaches for example, standardised tests, structured interview, portfolio assessment, informal assessment and the ability to utilise language-learning apps. Standardized tests, such as the TOEFL (Test of English as a Foreign Language) or IELTS (International English Language Testing System), are widely used to assess the language proficiency of non-English speakers (Brown, 2004). Conducting structured interviews allows evaluators to directly assess an individual's speaking and listening skills. The ACTFL Oral Proficiency Interview (OPI) is an example of such an assessment (Liskin-Gasparro, 1996). A portfolio assessment involves collecting and evaluating samples of a person's work overtime. This method provides a comprehensive view of an individual's language skills, including writing abilities (Reiss, 1994). Informal assessments through observations of daily interactions can provide insights into an individual's language skills in real-life contexts (Nunan, 2003). Utilizing language learning apps and online platforms that offer adaptive exercises and assessments can provide continuous and personalized evaluation of language skills (Stockwell, 2012).

### **Mathematical Skill**

Mathematical skills encompass a range of abilities related to understanding, manipulating, and applying mathematical concepts. These skills are crucial for problem-solving, quantitative reasoning, and making sense of numerical information. Mathematical skills refer to an individual's capacity to comprehend, analyze, and solve problems using mathematical concepts and operations. These skills include numerical reasoning, logical thinking, spatial understanding, and the ability to apply mathematical principles in various contexts (Steen, 1999). The mathematical skills can be measured using standardised tests, curriculum based assessment, performance based assessment, problem solving tasks, cognitive interviews and usage of digital and interactive tools. Standardized tests, such as the SAT (Scholastic Assessment Test) or ACT (American College Testing), assess mathematical skills and problem-solving abilities. These tests often cover topics like algebra, geometry, and data analysis (Lohman, 2006).

Curriculum-Based Assessment provide a measure of a student's mathematical skills within the context of what they have been taught. These assessments may include quizzes, tests, and projects (Shepard, 2000). Performance-based assessments involve tasks that require the application of mathematical skills in real-world scenarios.

Examples include solving authentic problems, conducting experiments, or creating mathematical models (NRC, 2001). Problem-Solving Tasks focus on problem-solving abilities and provide insight into an individual's capacity to apply mathematical concepts to new and complex situations. Problem-solving tasks may be embedded within larger assessments or presented as standalone challenges (Schoenfeld, 1992). Cognitive interviews involve probing individuals' thought processes as they solve mathematical problems. This method provides qualitative insights into how individuals approach problem-solving tasks (Bachman & Palmer, 1996). Digital and Interactive Tools utilise technology, such as educational apps or online platforms which allow for adaptive and interactive assessments of mathematical skills. These tools can be used to provide immediate feedback and personalized learning experiences (Roschelle et al., 2016).

### **Logical Reasoning**

Logical reasoning skills involve the ability to think critically, analyze information, and make sound judgments based on rational thinking. These skills are essential for problem-solving, decision-making, and understanding complex relationships. Logical reasoning skills encompass the capacity to evaluate information, draw logical inferences, recognize patterns, and make reasoned decisions. These skills are crucial for navigating various cognitive tasks, including deductive and inductive reasoning (Stanovich, 2016). Logical reasoning skills can be measured using standardised tests, critical thinking assessments, syllogistic reasoning tasks, problem solving scenarios, cognitive interviews and use of digital platforms and games.

Standardized tests, such as the LSAT (Law School Admission Test) or GMAT (Graduate Management Admission Test), often include sections that assess logical reasoning skills. These sections typically involve analyzing arguments, making deductions, and evaluating logical structures (Educational Testing Service, 2022; Law School Admission Council, n.d.). Critical thinking assessments, like the California Critical Thinking Skills Test (CCTST), are designed to measure skills such as analysis, inference, and deductive reasoning (Facione & Facione, 1992). Syllogistic reasoning tasks present individuals with logical statements and require them to draw valid conclusions. These tasks assess deductive reasoning skills and logical consistency (Evans, Newstead, & Byrne, 1993). Problem-Solving Scenarios assess present real-world or hypothetical problem-solving scenarios that can measure an individual's ability to apply logical reasoning in practical situations. These scenarios may involve decision-making, planning, and evaluating consequences (Ennis, 1996). Cognitive interviews involve probing individuals' thought processes as they engage in logical reasoning tasks. This qualitative method provides insights into the strategies individuals use to approach and solve logical problems (Ericsson & Simon, 1993). Digital Platforms and Games incorporate logical puzzles and challenges that can provide interactive and engaging ways to assess logical reasoning skills (Gee, 2003).

### **Mental Ability**

Mental ability refers to the overall capacity of an individual to engage in cognitive processes, including learning, reasoning, problem-solving, and memory. It is a broad construct that encompasses various cognitive functions. Mental ability is a comprehensive term that reflects an individual's cognitive aptitude and potential to perform intellectual tasks across different domains. This includes skills related to memory, attention, reasoning, and problem-solving (Gottfredson, 1997). Measurement of mental ability can be done using IQ tests, cognitive ability tests, memory assessments, attention and concentration tasks, problem solving tasks and neurocognitive assessments.

IQ tests, such as the Wechsler Intelligence Scale for Children (WISC) or the Stanford-Binet Intelligence Scales, are widely used to assess general cognitive abilities. These tests typically measure various aspects, including verbal comprehension, working memory, and processing speed (Wechsler, 2003; Roid, 2003). Cognitive ability tests evaluate specific cognitive functions, such as spatial reasoning, numerical reasoning, and logical thinking. These assessments are designed to measure domain-specific mental abilities (Hartigan, Wigdor, & Larson, 1978). Memory assessments, including tasks like recall, recognition, and spatial memory tests, provide insights into an individual's memory-related mental abilities (Baddeley, Eysenck, & Anderson, 2015). Attention and Concentration Tasks measure attention and concentration level of individuals to focus on specific stimuli, ignore distractions, and sustain attention over time (Posner & Petersen, 1990).

Problem-solving assessments, such as the Raven's Progressive Matrices, evaluate an individual's ability to discern patterns, make logical connections, and solve novel problems (Raven, 2000). Neurocognitive assessments, including brain imaging techniques and neuropsychological tests, which provide a more detailed understanding of the neural correlates of mental abilities (Lezak et al., 2012).

### **Analytical Skill**

Analytical skills involve the ability to interpret and understand complex information, identify patterns, and solve problems systematically. These skills are crucial for critical thinking and decision-making. Analytical skills refer to an individual's capability to analyze, interpret, and evaluate information, often involving the identification of patterns, connections, and solutions within data or complex situations (Kaufman, 2009). They can be measured using analytical thinking assessments, case studies, critical thinking tests, data analysis tasks, problem solving scenarios and situational judgement tests.

Analytical Thinking Assessments are designed to measure analytical thinking and can include tasks that require individuals to analyze information, draw conclusions, and make reasoned decisions. These assessments may be part of aptitude tests or standalone instruments (Bennett, 2003). Case studies present individuals with real or hypothetical scenarios that require analytical thinking. Participants are asked to analyze the situation, identify relevant factors, and propose solutions or recommendations (Yin, 2018). Critical thinking assessments, such as the Watson-Glaser Critical Thinking Appraisal, evaluate an individual's ability to think critically and make reasoned judgments by assessing skills such as inference, deduction, and interpretation (Watson & Glaser, 1980). Data analysis tasks involve data analysis, statistical interpretation, and drawing insights from numerical information measure an individual's analytical skills in handling quantitative data (Field, 2013). Problem-solving scenarios presents individuals with challenges that require analytical thinking. These scenarios can be diverse, covering various domains such as business, science, or engineering (Jonassen, 2011). Situational judgment tests present individuals with realistic workplace scenarios and require them to analyze the situation and choose the most appropriate course of action. These tests assess analytical thinking within specific contexts (McDaniel et al., 2007).

### **Objective of the study**

Students choose to study courses based on peer pressure and usually not what is of their interest or personal preference. This study intends to investigate the aptitude of students already enrolled in the Business Studies programs. The following questions were addressed:

- What is the aptitude of the student in different specializations?
- What is the aptitude of the student in different levels?
- What is the aptitude of the student according to gender?

This retrospective study targets the students enrolled in the Business Studies Department of a Higher Educational Institution in Oman during 2017 – 2018. The students that were included in the study were those already enrolled in the programs. The test was administered to those who volunteered to assess their aptitude themselves.

### **Methodology:**

The students of Business Studies were tested using a paper-based test comprising of six sections with questions related to their level. The areas tested included; language skill, mathematical skill, logical reasoning, common subject knowledge, mental ability, subject knowledge and general knowledge. The test was run in three cohorts comprising 129 (mixed levels), 182 (advanced diploma) and 133 (baccalaureate) students respectively. The first cohort was tested using 35 questions while the second and third cohort had to answer 30 questions.

### **Results:**

The findings of the three cohorts are presented as under. The scores achieved corresponding to the socio demographic characteristics of the respondents in cohort number one were as follows.

**Table No. 1**

**Scores related to socio demographics of the respondents**

<b>Cohort 1 (Mixed levels) n 129</b>	<b>Frequen cy</b>	<b>%</b>	<b>Ave Score/35</b>	<b>Ave Score as %</b>
Gender				
Female	90	69.77	18.53	52.94
Male	39	30.23	19.66	56.17
Specialization				
Accounting	85	65.89	18.81	53.74
EBA	28	21.71	18.96	54.17
Marketing	16	12.40	20.25	57.86
Level				
Ad Diploma	58	44.96	18.48	52.80
B Tech	71	55.04	19.19	54.83

In the first cohort a total of 129 students participated of which 90 (69.8%) were females and 39 (30.2%) were males. Specialization wise 85 (65.9%) were from Accounting, 28 (21.7%) from E Business Administration and 16 (12.4%) from Marketing sections. Fifty-eight (44.9%) students were from Advanced Diploma and 71 (55%) were in Baccalaureate level. These 129 students were evaluated in seven areas with 5 questions per area. Their average score was collated and calculated. The distribution shows female students fared with 53% and male had 56% scores out of the 35 questions. Accounting and EBA students scored 54% each while Marketing students scored the highest with 58%. The B-Tech students scored 55% compared to 53% score by the Advanced Diploma students. The results of the respondents of cohort number one in different skills tested are presented in table number 2 below:

**Table No. 2**

**Scores of the respondents in different domains tested**

<b>Cohort 1 Mixed levels n 129</b>	<b>Frequency</b>	<b>%</b>
Language Skill	1.92	38.4
Mathematical Skill	2.63	52.6
Logical Reasoning	0.85	17.0
Common subjects	2.09	41.8
Mental Ability	1.60	32.0
Subject Knowledge	1.92	38.4
General Knowledge	8.14	81.4
TOTAL	19.19	54.8

The detailed analysis of the scores achieved in different areas reflect that the respondents had scored the highest 81.4% in General Knowledge, 52.6% in Mathematical Skills, 38.4% each in Language Skill and Subject Knowledge, 41.8% in Common subject knowledge, 32% in Mental Ability and 17% in Logical reasoning. Overall the score was 54.8% in all areas. In the case of cohort number two comprising 182 students, the scores of the respondents representing different specializations are presented in table number 3.

**Table No. 3**

**Scores of the respondents by specialization**

<b>Cohort 2 Ad Diploma n 182</b>	<b>Frequency</b>	<b>%</b>	<b>Ave Score/30</b>	<b>Ave Score as %</b>
Accounting	111	60.99	13.42	44.73
HRM	60	32.97	11.78	39.27
Marketing	11	6.04	13.18	43.93
Overall score	182		12.76	42.53



In the second cohort the students of Advanced Diploma were targeted. A total of 182 students took the test, out of which 111 (61%) were from Accounting, 60 (33%) from Human Resource management and 11 (6%) from marketing specializations. The result of their achieved scores show that Accounting students scored the highest (44.7%), followed by Marketing students with 43.9% and lastly the Human Resource Management students scoring 39.3%. The overall score for the advanced Diploma students was calculated to be 42.5%. The results of the cohort number three by specialization are presented in table number 4.

**Table No. 4**

**Scores of the respondents by specialization**

<b>Cohort 3 n122</b>	<b>Baccalaureate</b>	<b>Frequency</b>	<b>%</b>	<b>Ave Score/30</b>	<b>Ave Score as %</b>
Accounting		18	14.75	12.88	42.93
EBA		38	31.15	13.34	44.47
HRM		64	52.46	12.81	42.70
Marketing		2	1.64	14.50	48.33
Overall score		122		13.01	43.37

The third cohort comprised of 122 Baccalaureate students distributed as 18 (14.7%) from Accounting, 38 (31.1%) from Electronic Business Administration, 64 (52.5%) from Human Resource Management, and 2 (1.6%) from Marketing. The scores achieved show that Marketing students scored the highest 48.3%, although the small number of participants does not make this finding generalizable. The Electronic Business Administration students scored 44.5%, followed by Accounting students with 42.9% and Human Resource Management students with 42.7%. The overall score for the Baccalaureate students was calculated as 43.4%.

**Table No. 5**

**Scores in different domains by level of respondents**

<b>Level Domain</b>	<b>AD Frequency</b>	<b>n 182 %</b>	<b>BT Frequency</b>	<b>n 122 %</b>
Quantitative Skill	3.12	62.4	3.42	68.4
Mental Ability	2.2	44.0	2.26	45.2
Logical Reasoning	1.58	31.6	1.71	34.2
Analytical Skill	2.26	45.2	1.95	39.0
Language Skill	1.68	33.6	1.74	34.8
General Knowledge	1.89	37.8	1.39	27.8
Total	12.76	42.53	13.01	43.4

Comparing the skills between the Advanced Diploma and Baccalaureate cohorts, the overall performance of Baccalaureate students was 43.4% compared to 42.5% in Advanced Diploma students, which was as expected.

In the item analysis the quantitative skills were the highest with 68.4% in the Baccalaureate students as compared to 62.4% in Advanced Diploma students. The mental ability was ranked second with 45.2% in Baccalaureate students as compared to 44% in Advanced Diploma students. In logical reasoning section the Baccalaureate students scored 34.2% while Advanced Diploma students secured 31.6%. In analytical skills the Advanced Diploma students scored higher than the Baccalaureate students with 45.2% and 39% respectively. In language skills the Baccalaureate students scored 34.8% compared to 33.6% by the advanced Diploma students. In general knowledge the Advanced Diploma students scored 37.8% compared to 27.8% by the Baccalaureate students. In summary, the Baccalaureate students scored better than the Advanced Diploma students in all areas except analytical skills and general knowledge.

### Conclusion:

Reviewing the data, it can be summarised that the male students in general fared marginally better compared to female students. At Advance Diploma level, accounting students had the highest average immediately followed by marketing students. However, both scored significantly higher than human resource specialisation students. At baccalaureate level, the scores of accounting, electronic business administration and marketing specialisation were similar. However, the score achieved by human resource management specialisation students was significantly lower. This could be because of the small sample of human resource students as compared to other specialisations, therefore it would be difficult to generalise the results. While comparing the scores of students at different levels according to various domains tested, overall score achieved was quite similar for both Advance Diploma and Baccalaureate students. Baccalaureate students did marginally better than advance diploma students in mental ability, logical reasoning and language skills but did significantly better in quantitative skills. However, two domains i.e. analytical skills and general knowledge emerged where Advance Diploma students had significantly higher score than Baccalaureate students.

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