

Citation: Abbas, S., Latif, S., & Khoso, F. J. (2023). Relationship between Students' Cognitive Abilities and Cumulative Grade Point Average at University Level. *Global Educational Studies Review*, VIII(I), 438 - 444. [https://doi.org/10.31703/gesr.2023\(VIII-I\).38](https://doi.org/10.31703/gesr.2023(VIII-I).38)

Relationship between Students' Cognitive Abilities and Cumulative Grade Point Average at University Level

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Abstract: *The better the cognitive abilities of undergraduate students, the better their academic performance. To identify the relationship between students' cognitive abilities and CGPA of B.S. and B. Ed (Hons.) students. The two universities, a public university (i.e., University of Punjab, Lahore) and a private sector university (i.e., University of Management and Technology) of the undergraduate students. The simple, purposive and disproportionate stratified random sampling techniques were applied and to take the 300 samples. In instrumentation, three different achievement tests were self-developed for three required subjects consisting i.e. Objective type questions (MCQs) tests of three subjects i.e. English, Psychology and Education. The three concerned departments and six specialists validate the test. The reliability checks through Cronbach's alpha and item analysis. The Pearson correlation, T-test, one-way and two-way ANOVA were applied for analysis. The finding, there was no significant correlation between the two universities.*

Key Words: Cognitive Abilities, CGPA, Assessment, Academic Performance

Introduction

Cognitive abilities are known as the abilities of the students including logical reasoning, solution of different problems faced by the individuals, planning the some occurring, recalling, understanding of complex concepts or ideas, and having the expertise by experiencing the happenings. Cognitive abilities are directly related to the mental ability that an individual needs to have to do any simple or complex task of routine. The how to learn, remembers, understand, solve

problems and sustain our attention. It was integrated that encoding information, access retrieves from memory and implication reasoning. They were used as an interpreter of academic performance. When these are taken in the general context, cognitive ability, in general, refers to the lower to higher-level thinking that humans are capable of (Borella, Carretti & Pelgrina, 2010).

Individually learn the procedures, embodies, responses, and information. Concentration, remembering skills, managing

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parameters, and convergent and divergent thinking is the basic process under cognitive process that has been studied in children with and without any disabilities. These cognitive procedures are having a huge range for learning in and out of the specific learning environment (Zelazo & Muller, [2019](#)). Cognitive assessment was the term used to predict the capabilities of a human brain, and how logical that brain is. This assessment is made by the paper-pencil test or the computer-based test to examine the wide range of cognitive abilities, such as thinking, remembering skills, logical reasoning skills, and brain functionality. This was the way to identify the cognitive status of the individual in a quantitative and qualitative way.

The taxonomy of Bloom was a system of categorization of educational goals based on the degree of the thoughtfulness of the students, which was obligatory for the fulfilment of skills. The taxonomy of Bloom was an agreement designed to categorize the goals of a curriculum under conditions of explicit and implicit cognitive abilities and skills. The taxonomy has been considered one of the most important models contributing to curriculum development in the 21st century. The Bloom taxonomy agreement explicitly and implicitly categorizes the basic objectives of a curriculum. This taxonomy was known as the most important method that plays a crucial role in curriculum development (Forehand, [2005](#)).

The taxonomy of educational goals, i.e., the cognitive domain, and the six levels of clarification of thought, have so far been largely coordinated and applied in countless contexts. Its tabulation of cognitive processes was composed of the simplest, the retrieval of knowledge, which was complicated and judged the value and worth of a scheme. With regard to Bloom's revised taxonomy, changes are observed in three main areas. These include terminology, placement and emphasis. The Bloom taxonomy was often cited in many teacher training programs in relation to how students learn and how they teach (Forehand, 2005; Krathwohl & Anderson, [2003](#); Lambert et al., 2017).

It contains six levels with the principle that their competence at a higher level implies a reasonable level of ability at the lower levels. But it was chosen at the lowest levels: or as knowledge and understanding, i.e. knowledge; students must remember facts they have already learned and recall them as they were learned. In Level 2, Understanding, students must be able to reformulate information based on their own statements, translate knowledge into a new perspective, and interpret graphs, tables and charts.

The comprehension studies show the grip of information resource considerations by sorting out, comparing, deciphering, decoding, presenting representations and references to the most important considerations, and furthermore by methods of extrapolation. Students in the cognitive phase really bypass the examination of realities (Barel, [2018](#)).

Knowledge may additionally be of special categories, such as know-how of specifics terminology, unique data knowledge of approaches and skill of dealing with specifics conventions, tendencies and sequences, classifications and categories, criteria, methodology know-how of the universals and abstractions in subject standards and generalizations, theories and sequence of knowledge question.

Approaches of Knowledge

There are many sorts of expertise however different kinds of knowledge were discussed here.

Declarative Knowledge

Declarative understanding could be described as understanding what. This kind of expertise can be subdivided into two specialized memories: Semantic memory or common understanding of the world like specific facts, definitions and principles. Episodic reminiscence or expertise about our personal life experiences like events, places, times and circumstances, additionally recognized as autobiographical knowledge.

Procedural Knowledge

Procedural basic information has been described as "knowing how," our expertise in how to operate tasks. An attribute of procedural information is that, in contrast to declarative knowledge, we are not able to consciously retrieve these records from long-term memory. This attribute makes procedural know-how tough or not possible to verbalize; therefore, it has additionally been called implicit memory.

A pupil makes use of his procedural expertise when enticing in an automatic task. An instance was once typing an essay on a computer, supplied that typing has been practised so largely that it has come to be an automated process and the pupil does not necessarily have to consciously control it any longer. Often entails a series of logical steps and there is self-discipline particular information of skills, algorithms, techniques or methods.

Conditional Knowledge

Conditional information is "knowing when and why" to practice declarative and procedural knowledge. It takes students' conditional expertise to decide when to follow a suitable math method (e.g., addition, subtraction, division, multiplication) to remedy story problems. Thus, teachers were aware that their students recognize the relative nature of knowledge, which requires adapting what is regarded to unique prerequisites and contexts.

Strategic Knowledge

They are helping the scholar to prepare the hassle-solving procedure by displaying to the pupil which levels he compulsory go through in order to attain a solution.

Rational Knowledge

Rational information understands the proportional relationship between the components of something. Mathematics is the preeminent discipline for experiencing and educating the nature of rationality, which is

why historically the Greeks embraced getting to know geometry with such devotion.

The association between academic achievement and performance must be further bridged to minimize the gap that exists in the design, delivery and evaluation of specific courses, including student academic assessment. Kuncel et al., [2004](#); Sternberg et al., 2001; Tenijenhuis et al., 2004). In other words, the curriculum and delivery of the institution must be continuously involved in both student-centred and outcome-based assessments (Lambert et al., [2017](#)).

The Grade Point Average (GPA) is the combination of all final grades for courses within a program, weighted by the value of units for each of these courses. There are more than a few approaches to determining overall student performance, such as CGPA, GPA, grading and proportions (Agus & Makhbul, [2002](#)).

The Cumulative Grade Point Average (CGPA) is a calculation of the combined grades of all students in all publications required for an entire degree. Grades in courses are based primarily on the assessment of a student's performance by the instructors. The average of the semester or session grade factor and the average of the cumulative grade factor are calculated to assess or select students' performance. These averages are used to determine whether a student qualifies for specific learning strategies and programs. CGPA is based entirely on the overall comparison of the educational year or credit point.

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average of the semester or session grade factor and the average of the cumulative grade factor are calculated to assess or select students' performance (Ervina & Othman, 2005). As a rule, CGPA is calculated at the end of the entire academic semester or year. CGPA refers to the total GPA, which consists of dividing the range of high-quality points earned in all the tested guidelines.

Research Objectives

Following objectives of the study:

1. Find out the relationship between students' cognitive abilities and cumulative grade point average at the university level
2. Determine the gender-wise significant differences in the student's cognitive abilities and cumulative grade point average

Null Hypotheses

There are three concerned null hypotheses are listed below:

- H₀₁. There is no significant relationship between students' cognitive abilities and the cumulative grade point average of undergraduate students of the University of Punjab and the University of Management and Technology
- H₀₂. There is no statistically gender-wise significant difference between the cognitive abilities of the students. H₀₃. There is no statistically gender-wise significant difference in the CGPA of the students.

Research Methodology

Research methodology deals with methods and procedures used in the study. The study was quantitative in nature and used a correlational research design. It focuses on the creation view of philosophical research, the population of the test, the test of the investigation, the investigation of the instrumentation, the approval and reliability of instruments, and the

methodology of the nature of the study was quantitative, descriptive and co-relational. The study was conducted on two universities, the University of Punjab (PU) and the University of Management and Technology (UMT), Lahore. The population was 1197 undergraduate students from the three common departments of both universities.

The sample of the study applied multi-stage sampling including different sampling techniques. In the first phase, the random sampling technique was applied for the selection of both universities from Lahore city was taken in which one public sector and one private university were selected for conducting this study. From the public sector, the University of the Punjab (PU) and from the private sector, the University of Management and Technology (UMT) Lahore, were chosen for the study.

A purposive sampling technique was applied for the selection of three departments of both universities. The three common departments were taken from both of the universities as Department of English, Department of Psychology and Department of Education. The disproportionate stratified random sampling technique was applied for the selection of undergraduate students of both universities. The sample size was 300 undergraduate students from three common departments.

Limitations

The duration of the data collection was as same as the summer vacations in both of the universities due to it consumed a lot of time to finalise this study.

Data Analysis and Interpretation

Appropriate statistical techniques were used for the analysis of quantitative data, Pearson correlation, Independent sample t-test, and one-way and two ways ANOVA was used to analyze the data. The statistical techniques were applied Pearson correlation, Independent sample t-test, one way and two-way ANOVA.

Table 1*Measurement of relationship between cognitive abilities and CGPA*

Variables	N	Mean	SD	'r'	Sig.
Cognitive Abilities	300	15.63	6.528	.035	.542
CGPA	300	3.28	.366		

Table 1 shows that Pearson product-moment correlation was used to measure the relationship between cognitive abilities and CGPA of the undergraduate students of PU and UMT. It was found that there was no significant relationship between both of the universities (i.e., PU & UMT) at the value of $p=0.542$ ($p<0.005$) and Person $r=.035$

Hence, it was reported that the null hypothesis was accepted and the research hypothesis was rejected, so, the results calculated that neither the cognitive abilities of students affect their CGPA; neither there is any effect of CGPA on the cognitive abilities of the students. The academic performance of the students does not correlate them their cognitive abilities but with hard work.

Table 2*Description of gender-wise difference between cognitive abilities*

Gender	N	Mean	SD	Df	t-value	p
Male	114	96.97	13.409	298	3.457	.001
Female	186	102.95	15.189			

An independent sample t-test was applied to measure the difference between male and female students in cognitive abilities. There was a significant difference between male and female responses about students' cognitive abilities. The mean score of male responses ($M=96.97$, $SD=13.409$) and mean of female responses ($M=102.95$, $SD=15.189$), t (298)

$=-3.457$). It shows that the mean score of male and female answers were correct regarding cognitive abilities. So that was a statistically significant difference in the cognitive abilities of both genders. So the results of the research hypothesis were accepted and the null hypothesis was rejected.

Table 3*Description of gender -wise difference between CGPA*

Gender	N	Mean	SD	df	t-value	P
Male	114	3.25	.399	298	1.117	.265
Female	186	3.30	.345			

An Independent sample t-test was applied to measure the difference between male and female students in cumulative grade point average. There was no significant difference between male and female students' responses about cumulative grade point averages. The mean score of male responses ($M=3.25$, $SD=.399$) and mean of female responses (Female= 3.30 , $SD=.345$); t (298) $=-1.117$.

It was found that there was no significant relationship between both of the universities

(i.e., PU & UMT) at the value of $p=0.542$ ($p<0.005$) and Person $r=-.035$. Hence, it was reported that the null hypothesis was accepted and the research hypothesis was rejected (see table 4.4). There was a significant difference between male and female responses about students' cognitive abilities.

Discussion

The studies were applied to the relationship

between cognitive abilities and cumulative grade point average at the university level. In the relationship study between cognitive abilities and cumulative grade point average, there was no statistically significant relationship. Likewise, a study conducted by Taub (2008) was found in literature having the same theme as to check the relationship between cognitive ability and students' achievement. This similarity supports the constructs of the study that showed the relationship between students' cognitive abilities and achievement ideas about the same constructs. The rationale behind this support was that no link between students' cognitive abilities and academic achievement or not enough considerable report the results showed that there was no statistically significant difference in cognitive abilities and academic achievement according to university students' scores. The current study here expressed that the student's cognitive abilities miss matched their CGPA. It could also be a student has a good CGPA than their cognitive abilities or is low compared to their CGPA (Academic Achievement).

The academic performance of the students did not correlate them their cognitive abilities but with hard work. Here, addressing the nature of this objective, it was measured that the students are not working hard to maintain their cognitive calibre in relation to the CGPA they are awarded by the institute or the department studying in PU and UMT. A study found a gender-wise difference in cognitive abilities and cumulative grade point average (Leeson et al., 2008). Here we also had the findings that males and females have statistically significant differences in cognitive ability and the findings that males and females have no statistically significant difference in CGPA.

The results of this research revealed that there was a unique role of gender that predicted CGPA (Academic Achievement). Hence research contributed to the current topic with reference to the following prediction of the topic. This study had a similarity with the findings of this study as both the males and

females have significant differences and no significant difference in providing the response about cognitive abilities and academic achievement.

A study was in favour of one of the demographic variables of the current study that variable was gender-wise performance under the cognitive abilities and

cumulative grade point average. That study found that gender performance was one of the basic elements of cognitive abilities with good results (Law, 2012).

Conclusion

The Measure of cognitive abilities of the undergraduate students of University of the Punjab (PU), a public sector university and University of Management and Technology (UMT) by choosing a sample from the following population by conducting the tests of three broader disciplines i.e., English, Psychology and Education to measure and examine whether there was any relationship of students' cognitive abilities and their CGPA being the main objective of the study.

It was found that there was not any significant relationship between both of the variables under the study. The study found significant differences in cognitive abilities regarding the gender variable but there was not found any difference in comprehension of students. Therefore, it was concluded on the basis of the results of the following study, the cognitive abilities of students do not correlate with their CGPA at the undergraduate level in both of the universities which replicates and attests to the previous studies conducted on the following topic.

Recommendations

The students at the undergraduate level in the universities of Punjab should be assigned teacher (s) who has/have a degree with specialized knowledge education related to their specific field of study. Education programs for teachers should provide them with a specific foundational knowledge of the development of students' social and affective behaviour, thinking and language.

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