

Intelligence Quotient Test: Perceptions vs. Realities among Undergraduate Students

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ABSTRACT

Introduction: IQ test continue to be one of most reliable tools to measure intelligence skills of the human. *Method:* In this paper, the different types of perceptions of the undergraduate students were compared to their real full scale IQ scores.

Results: Results show that students overrate or underrate their IQ skills. Students with lower IQ scores tend to believe that this may affect their academic and future job performance.

Conclusions: Discussion of the findings was presented with further advises for the educators and counsellors.

Key words: IQ, Wonderlic personnel test, Perception, Computer science

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INTRODUCTION

Most of the experts and researchers describe intelligence as a problem-solving skills and abilities. These skills can be listed as having good vocabulary skill, decision making, logical reasoning, memory and mental speed [1]. Intelligence Quotient (IQ) can be directly linked to mental age and chronological age. Until 18 years, mental age should develop with chronological age, while it is assumed by 18 years it would be fully developed [2]. It is now appears that fluid intelligence (solving puzzles and coming up with problem-solving strategies) may start to decrease with older age after 18, but crystallized intelligence (knowledge that comes from prior learning and past experiences) continue to develop throughout the person's lifespan [2,3].

Speaking about IQ from quantitative perspective, IQ is total score (or Full Scale IQ – FSIQ) which

is derived from some standardized tests which are designed to measure human intelligence [4]. In other words, IQ tests assess person's mental abilities to compare with other people abilities in quantitative way [1,5].

For several decades the IQ score and IQ test were subject to discussion. Many re-searchers and practitioners argued about reliability of IQ tests and IQ scores; do they really predict the intelligence or it is only predicting some numeric abilities of the person. But psychometricians generally accept IQ tests as a statistically reliable tool, and have sufficient statistical validity to use it for different type of clinical purposes [6,7]. For instance, Kaufmann stated that IQ scores are decreasing starting from skilled workers to unskilled workers, thus underlining the reliability of the test [3].

FSIQ was directly related to academic success and job performance in many re-searches. Starting from primary school up to university level, educational attainment can be moderately predicted by IQ, while it is accounted for almost 50% of the variation [4, 8]. IQ scores are used

during educational placement as well, as they have very high correlation between SAT ($r=0.82$) and GCSE ($r=0.81$) scores [9,10]. But there is contradictive positioning as well, like Kamphaus et al. stated that while explained variance for Mathematics was 58% and 48% for English, IQ test couldn't present such strong correlation between Art-Design subjects, falling below 20% of explained variance [10].

IQ tests continue to be practical tool in job interviews and evaluation of the job performance [11]. In the same way, IQ tests were strongly correlated with job performance and job knowledge acquisition by other researchers [4,9]. For instance, Kauffman et al. presented a mean IQ scores for profession fields like professionals and technical, managers and administrators, clerical workers, semi-skilled workers and finally unskilled workers and their corresponding IQ scores were in ascending form, respectively [3].

Mostly addressed and used reliable IQ tests like Wechsler Adult Intelligence Score (WAIS), Wonderlic Personnel Test and Stanford-Binet Intelligence Scales can be generally subcategorized as measuring vocabulary abilities, numeric abilities and logical reasoning [4,12]. This sub categorization differs from test to test, but usually using same type of questions. Braaten et al. divided IQ test in 3 main subcategories, as it is presented in Table 1, plus one more subsection related to speed of solving.

As the current literature shows, IQ tests were extensively investigated. Its relation to academic success and job performance were subject for researches. But there is still a gap which need to be addressed, which can be asked as one summarized question - what is the human's perception toward the IQ scores and if this perception has real basement? In this research, several perception aspects toward IQ tests were investigated. As the IQ is correlated to academic success and job performance, undergraduate students' perception in this field was investigated; do they accept IQ test as reliable tool, do they do rational self-evaluation in terms of IQ skills and some other perceptions.

PURPOSE OF THE STUDY

This research tends to answer following questions and objectives:

- ✓ If repetitive taking of IQ tests improve the IQ scores.
- ✓ To compare FSIQ scores of the students with different perceptions, in term of academic and job success.
- ✓ If students self-believe in verbal, logical and numeric IQ have real basements.
- ✓ If the students are overrating or underrating their IQ skill abilities.

METHODOLOGY

Ethics and regulations

The experimental protocol was by following international ethical standards. The study was performed per under the Helsinki Declaration (1975, revised in 1996-2013). The aims and objectives of the study were explicitly explained to the participants before the commencement of the study. All participants voluntarily gave verbal informed consent to participate in the study.

Participants

Subjects were undergraduate students from computational science departments; Computer Science, Software Engineering and Information Technologies of Nile University of Nigeria. Total of 183 students; Computer Science-106 students, Software Engineering-44 students and Information Technologies-27 students. Gender ratio was 107 males to 76 females. The experiment consisted of two parts, survey about IQ perception and IQ test itself, with 1-week gap between them.

Wonderlic personnel test

The Wonderlic Personnel Test is a timed 15-minute test made up of 50 questions, where each correct answer worth one point. Scores can range from minimum of 0 to maximum of 50 [13]. The questions were marked as verbal type, logic type or numer-ic type question by the author

Table 1: Subsections of IQ Test.

Subtest	Types of questions
Verbal Comprehension	Similarities, vocabulary, word reasoning, information extraction
Perceptual (Logic) Reasoning	Picture concepts, picture completion, block design, matrix reasoning
Working Memory (Numeric)	Number sequencing, arithmetic, digit span

for later use. Thus, test contained 17 verbal, 17 numeric and 16 logic questions. Students were requested to finish the test in 15-minute period. No time extension was given. Three subsections were marked as VIQ-verbal IQ, LIQ-logic IQ and NIQ-numeric IQ. The sum of VIQ, LIQ and NIQ was marked as FSIQ- full scale IQ.

Survey

The general knowledge about IQ, IQ test and perception of IQ was asked to students. Table 2 is summary of this survey with shortened question topics for the further use.

Statistical analysis

All the measures values are given as a mean (M) +/- standard deviation (st.dev.). The statistical analysis tool was SPSS, v.26. The Student's t-test was used to compare means of the groups. Pearson correlation coefficient was employed to establish relation between two different datasets. The p value equal or below to .05 was accepted as statistically significant.

ANALYSIS OF THE RESULTS

Survey results

Most of the answers of the survey were well distributed with some exceptions. Table 3 presents the distribution of the participant's answers. Majority of the students do not believe that IQ is affecting academic performance. More than two-third of the students prefer to work on school projects with high IQ students. 73% of the participants believe that their logic IQ is strong and more than half of the participants do not trust to their numeric IQ abilities. Last but not the least, 80% of the students believes that they can do it to upper half in class standing.

General performance of the participants

The Figure 1 presents the distribution of FSIQ (M=24.05, st.dev=6.66) and CGPA (M=3.35, st.dev=0.87) scores of the students with respect to normal distribution curve. While FSIQ score is almost perfectly fit to normal distribution, CGPA also fitting the curve with some variations. Thus,

Table 2: Content of the survey.

No.	Question	Answer options
Q1-CGPA	What is your CGPA?	Numeric input
Q2-Taken	Did you take full scale IQ test before?	Yes No
Q3-Academic	Do you believe that your IQ level is representing your academic performance?	Yes No
Q4-Job	Do you believe that your IQ level will affect the success of your professional career?	Yes No
Q5-Preference	Who would you prefer for school project work?	Student with high IQ My friend
Q6-Subcategories	Which of the following IQ subsections are you good at?	Verbal IQ Logic IQ Numeric IQ
Q7-Position	If you take IQ test with your classmates, what would be your position in class ranking?	Top 10% Upper half Lower half

Table 3: Distribution of the groups based on survey.

No.	Options	Frequency
Q2-Taken	Yes	53%
	No	47%
Q3-Academic	Yes	28%
	No	72%
Q4- Job	Yes	55%
	No	45%
Q5-Preference	Student with high IQ	71%
	My friend	29%
	Verbal IQ	63%
Q6-Subcategories	Logic IQ	73%
	Numeric IQ	45%
	Top 10%	35%
Q7-Position	Upper half	45%
	Lower half	20%

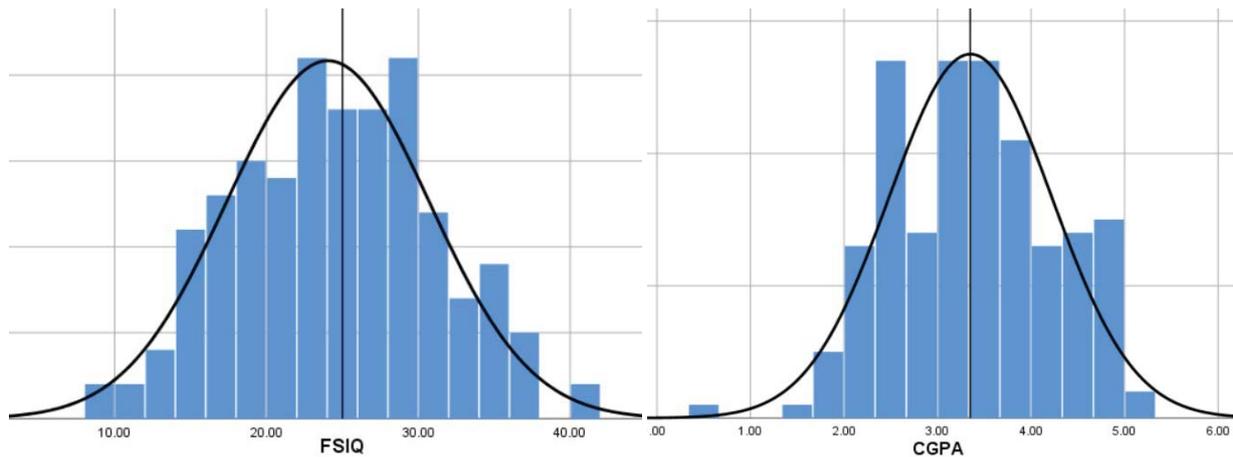


Figure 1: Distribution of FSIQ and CGPA scores.

the scores are reliable to suggest significant differences, if they exist. As the supportive fact to the existing literature, there was significant correlation ($r=.34$, $p=.0001$) between FSIQ and CGPA score.

Key findings

Student's t-test results are presented on Table 4. FSIQ scores are compared between groups, and the significant ones are sketched as boxplot in Figure 2. No significant difference was detected between FSIQ scores of the students who took full scale IQ test before and first-time taker (Q2). Thus, deriving conclusion that repetitive taking IQ test has actually low effect on improvement of FSIQ. In the same manner, one-way ANOVA test showed that there was no significant score difference between students position predictions - Top 10%, upper half lower half (Q7). That means that students can easily overrating or underrate their IQ abilities.

Students who believe that IQ capacity will affect their future job performance have significantly lower FSIQ comparing to those who do not believe in (Q4). This result definitely underlining the fact that students with lower IQ level afraid that they may not be successful on their job performance as others with higher IQ. In the same manner, students with lower FSIQ, believe that their IQ level is affecting their academic performance (Q3).

One of important findings during the experiment was the fact that students with higher FSIQ prefer to choose their close friends to work on school project, while on other hand, students with lower FSIQ tent to work with students with higher FSIQ (Q5). It can be concluded that

confidence of the students with higher IQ level push them for more friendly project working environment, rather than to work with best ones to produce better project.

Even though it was not the objective of this study, one more significant finding was that male students of private university in Nigeria scored higher than female students from the same environment. This phenomenon was discussed in many previous researches, but no common conclusion was derived, as most of the researcher's states that difference in FSIQ scores between genders may differ with respect to countries, cultures, nations and tribes.

The second part of the experiment was to see if the IQ strength perceptions of the students are reflecting the realities. Students were asked to identify if they are weak or strong in verbal, logic and numeric IQ. Their respective scores in real verbal, logic and numeric IQ test were compared. Table 5 is summary of the subsections. The is no significant difference between VIQ and LIQ scores between weak among strong groups. This fact leads us to the conclusion that students wrongly believe that their verbal and logic IQ are strong. On the other hand, more than half of the participants described their numeric IQ as weak, and their respective NIQ scores are significantly lower than those who describe it as strong. In conclusion, it is clear that students clearly know their numeric abilities, whereas they overrate or underrate their verbal or logic IQ skills. This fact was also supported in student's position predicting, where students overrated or underrated their class position.

Table 4: Mean, standard deviation, t and p values for different groups

No.	Groups	FSIQ Mean and st.dev.	t and p values
Q1-Gender	Male (N=102)	24.88 ± 7.03	t=2.01
	Female (N=72)	22.86 ± 5.94	p=0.04*
Q2-Taken	Yes (N=94)	23.81 ± 6.79	t=0.48
	No (N=80)	24.31 ± 6.53	p=0.68
Q3-Academic	Yes (N=50)	22.72 ± 6.52	t=1.97
	No (N=124)	24.58 ± 6.66	p=0.05*
Q4-Job	Yes (N=97)	24.92 ± 6.71	t=1.96
	No (N=77)	22.93 ± 6.47	p=0.05*
Q5-Preference	High IQ (N=119)	23.38 ± 6.66	t=1.96
	My friend (N=56)	25.81 ± 6.48	p=0.05*

* significant at p=0.05 level

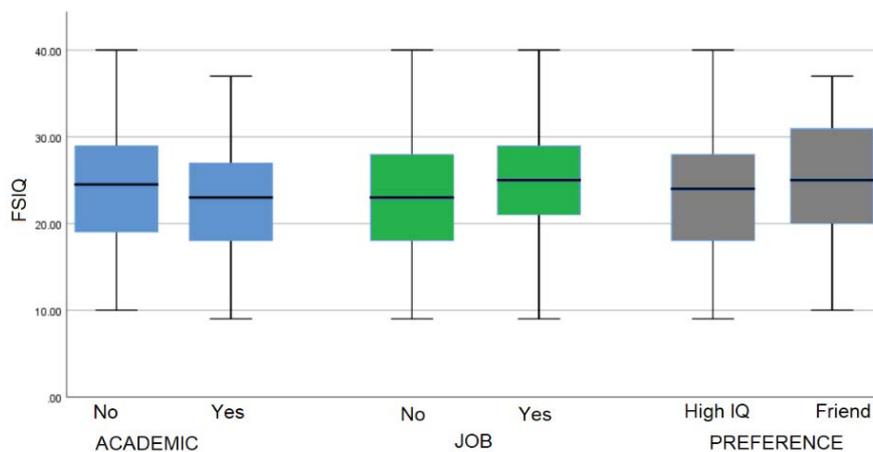


Figure 2: Box plot for FSIQ scores for Academic, Job and Preference.

Table 5: Mean, standard deviation, t and p values for different groups.

No.	Groups	Mean and st.dev.	t and p values
Verbal IQ	Weak (N=64)	9.54 ± 3.33	t=0.907
	Strong (N=110)	9.98 ± 2.87	p=0.36
Logic IQ	Weak (N=47)	5.59 ± 2.36	t=0.48
	Strong (N=127)	5.78 ± 2.31	p=0.63
Numeric IQ	Weak (N=95)	23.38 ± 6.66	t=3.27
	Strong (N=79)	25.81 ± 6.48	p=0.001**

**Significant at p=.001 level

DISCUSSION AND CONCLUSION

During the experiment following answers were given to the questions and objectives asked in Section 1.1, based on the results of the experiment.

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