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A Comparative Study of Intelligence in Relation to Academic Achievement in Physics of the Secondary School Students

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ABSTRACT:

The present study tries to investigate the relation between the intelligence and the academic achievement in Physics of the secondary school students of Balasore district of Odisha. It focuses also the impact of students' intelligence on their academic performance in Physics with respect to their gender and habitat strata. Quantitative methodology is used for this study over 300 students of class – X from six purposively selected secondary schools. Statistically analyzed data reveals high positive correlation between the scores of students' intelligence and their achievement scores in Physics. The intelligence of the secondary students entirely influences their academic achievement in Physics.

Key words: Intelligence, Academic Achievement, Physics, Secondary Students

Introduction:

Intelligence is a very strong and relevant predictor of academic achievement. It is an important factor that influences students' academic performance and helps them to enhance their learning abilities, better understanding as well as cognitive development. Different research studies consistently show the significant positive correlation between intelligence and academic achievement in school, there association is well established. But, intelligence is not the sole determinant; there are some other factors which play a vital role for academic success. Numerous research findings demonstrate that the intelligence is necessary for students' learning and training. It reveals that the students' having more intelligent can acquire learning more rapidly and efficiently than the students having less intelligent. Curricula are designed for nurturing, developing and stimulating several cognitive abilities (intelligence) for out coming knowledge and skills (academic achievement).

Meaning and Definitions of Intelligence:

In respect of educational context, intelligence is generally the capacity to learn, ability to understand abstract concepts, acquire knowledge, ability to adapt changing situations, identify problems and work out effective solutions. According to Einstein, "The true sign of intelligence is not knowledge but imagination." Beside general intelligence people possess multiple intelligences. According to Howard Gardner's theory of multiple intelligences it includes logical-mathematical, musical-rhythmic, verbal- linguistic, bodily- kinesthetic, visual- spatial, interpersonal, intrapersonal and naturalistic. He again included in 2009 the existential and moral types of intelligence.

Intelligence is defined in different ways: According to

- **Stern:** "Intelligence is the general mental adaptability to new problems and conditions of life."
- **Edward:** Intelligence is the capacity for variability and versatility of response.
- **Alfred Binet**: Intelligence is a combination of judgment, practical sense, initiative, and adaptability, focusing on the ability to think and reason, rather than a single, fixed capacity.
- **Terman:** Intelligence is the ability to carry on abstract thinking.
- **Cattell:** Intelligence is capacity to acquire capacities.
- **Buckingham:** "Intelligence is the learning ability."
- **Terman:** "An individual is intelligent in proportion as he is able to carry on abstract thinking."
- **D. Weschler: "**Intelligence is the aggregate or global capacity of the individual to act purposefully, to think rationally and to deal effectively with the environment."

Academic Achievement:

Academic achievement is the knowledge of the subject matter that acquired through instruction. There are so many individual differences among the students. Their intelligence levels are different, which causes to increase their ability to learn the content of study. Crow & Crow traced, "Achievement

means the extent to which learner is profiting from instruction in a given area of learning". Academic achievements are measured by test scores, grades, and by other assessments. As outcome it reflects students' knowledge and skills that are acquired through their learning experiences. Academic achievement is the most important goal of teaching – learning process.

The present investigation intents to establish the relation between the intelligence and the academic achievement in Physics of the secondary school students in Balasore district of Odisha.

Statement of the Problem:

The authors of this study attempt to find out the impact and effectiveness of the intelligence test scores to the academic achievement in Physics. The review of literatures related to the problem of study reveals that there is no such endeavor was initiated earlier. So, the authors have intended on the problem: **A Comparative Study of Intelligence in Relation to Academic Achievement in Physics of the Secondary School Students.**

Research Questions:

1. Is the inter correlation between the intelligence scores and the achievement scores in Physics significant?
2. Do the intelligence scores and the achievement scores in Physics differ significantly?
3. Do the intelligence scores and the achievement scores in Physics of the urban secondary students differ significantly?
4. Do the intelligence scores and the achievement scores in Physics of the rural secondary students differ significantly?
5. Do the intelligence scores and the achievement scores in Physics of the secondary boy students differ significantly?
6. Do the intelligence scores and the achievement scores in Physics of the secondary girl students differ significantly?

Objectives of the Study:

1. To identify the relation between the Intelligence Test (I.T.) scores and the achievement scores in Physics.
2. To compare the impact of Intelligence scores of the urban and rural secondary students on their achievement scores in Physics.
3. To compare the impact of Intelligence scores of the boys and girls secondary students on their achievement scores in Physics.

Hypotheses of the Study:

- **H_1:** There is no significant inter correlation between the intelligence scores and the achievement scores in Physics.
- **H_2:** There is no significant mean difference between the intelligence scores and the achievement scores in Physics.
- **H_3:** There is no significant mean difference between the intelligence scores and the achievement scores in Physics of the urban secondary students.
- **H_4:** There is no significant mean difference between the intelligence scores and the achievement scores in Physics of the rural secondary students.
- **H_5:** There is no significant mean difference between the intelligence scores and the achievement scores in Physics of the boys secondary students.
- **H_6:** There is no significant mean difference between the intelligence scores and the achievement scores in Physics of the girls secondary students.

Design of the Study:

This study was conducted by using descriptive survey method.

Variables of the Study:

- Independent Variable: Intelligence
- Dependent Variable: Academic Achievement
- Moderate Variables: Gender and habitat strata

Sample:

A sample of 300 secondary students of class – X of both gender were randomly selected from six secondary schools in urban and rural areas of Balasore district of Odisha. The author perceives that 300 samples are quite sufficient and satisfactory for the present study.

Tools used:

1. A standardized intelligence test
2. A standardized test of Physics questionnaire

Procedure of the Study:

All the Research Questions, Objectives and Hypotheses related to present study bearing in mind and using suitable sampling techniques the researchers visited to the purposively selected secondary schools of both urban and rural areas of Howrah district, West Bengal. With prior permission of the concerned school authorities the researchers implemented one adopted standardized Intelligence Test and one self - constructed standardized "Secondary Students Physics Achievement Test (SSPAT)" towards the participant secondary students. Data were statistically analyzed using Mean, Median, Standard Deviation, Pearson's coefficient of correlation and t- test.

Data Presentation and Analysis:

Descriptive Statistics

Table -1

Scores in	Sample Size (N)	Mean(M)	Median	Standard Deviation (S.D)
I.T.	300	40.88	39.78	13.56
Physics		38.73	39.40	17.30
IT(urban)	300	45.51	45.50	13.97
Physics(urban)		38.80	38.95	15.95
IT(rural)	300	36.25	35.42	11.71
Physics(rural)		41.60	40.00	18.50
IT(boys)	300	44.33	44.14	14.93
Physics(boys)		49.50	50.95	16.00
IT(girls)	300	39.00	38.25	12.33
Physics(girls)		35.15	33.95	15.85

Result and Discussion:

H_1: There is no significant inter correlation between the intelligence scores and the achievement scores in Physics.

r = Co-efficient of correlation between the intelligence scores and achievement scores in Physics

Table: 2

Scores in	Sample	df =N -2	Critical value of r at 0.05 level of significance	Calculated value of r	Status of r (S /NS)
IT Physics	300	298	0.113	0.37	**S**

N = Sample Size df = Degrees of freedom

S = Significant NS = Not Significant

The asking correlation (r) is positive and significant. Therefore, the null hypothesis **(H_1)** is rejected. It means that there is significant relationship between the intelligence scores and the achievement scores in Physics.

H_2: There is no significant difference between the intelligence scores and the achievement scores in Physics.

Table - 3

Test of	N	df	M	Mean Difference	SD	SE_D	t	Significance at 0.05 level	P	S / NS
IT	300	598	40.88	2.15	13.56	1.27	1.69	1.96	> 0.05	NS
Physics	300		38.73		17.30					

M = Mean of scores SE_D = Standard Error P = Probability

The results of Table: 3 clearly show a non – significant (NS) difference between the intelligence and the academic achievement scores in Physics of the secondary students. So, the null hypothesis **(H_2)** is retained.

H_3: There is no significant difference between the intelligence scores and the achievement scores in Physics of the urban secondary students.

Table - 4

Test of	N	df	M	Mean Difference	SD	SE_D	t	Significance at 0.05 level	P	S / NS
IT(urban)	300	598	45.52	6.71	13.97	1.73	3.88	1.97	< 0.05	S
Physics(urban)	300		38.80		15.95					

The results of Table: 4 show clearly a significant difference between the intelligence and the academic achievement scores in Physics of the secondary school students. So, the null hypothesis **(H_3)** is rejected. It means that the intelligence of urban secondary students have positive impact towards their academic achievement in Physics.

H_4: There is no significant difference between the intelligence scores and the achievement scores in Physics of the rural secondary students.

Table - 5

Test of	N	df	M	Mean Difference	SD	SE_D	t	Significance at 0.05 level	P	S / NS
IT(rural)	300	598	36.25	5.35	11.71	1.78	2.98	1.97	< 0.05	S
Physics(rural)	300		41.60		18.50					

The results of Table: 5 show clearly a significant difference between the intelligence and the academic achievement scores in Physics of the secondary school students. So, the null hypothesis **(H_4)** is rejected. It means that the intelligence of rural secondary students have positive impact towards their academic achievement in Physics.

H_5: There is no significant difference between the intelligence scores and the achievement scores in Physics of the boys secondary students.

Table - 6

Test of	N	df	M	Mean Difference	SD	SE_D	t	Significance at 0.05 level	P	S / NS
IT(boys)	300	598	44.33	5.17	14.93	2.13	2.43	1.97	< 0.05	S
Physics(boys)	300		49.50		16.00					

The results of Table: 6 show clearly a significant difference between the intelligence and the academic achievement scores in Physics of the secondary school students. So, the null hypothesis **(H_5)** is rejected. It means that the intelligence of secondary boys students have positive impact towards their academic achievement in Physics

H_6: There is no significant difference between the intelligence scores and the achievement scores in Physics of the girls secondary students.

Table - 7

Test of	N	df	M	Mean Difference	SD	SE_D	t	Significance at 0.05 level	P	S / NS
IT(girls)	300	598	39.00	3.85	12.33	1.44	2.67	1.97	< 0.05	S
Physics(girls)	300		35.15		15.85					

The results of Table: 7 show clearly a significant difference between the intelligence and the academic achievement scores in Physics of the secondary school students. So, the null hypothesis **(H_6)** is rejected. It means that the intelligence of secondary girls students have positive impact towards their academic achievement in Physics

Major Findings:

- The intelligence and the achievement scores in Physics of the secondary school students of Balasore district are correlated.
- Non-significant difference exists between the intelligence and the achievement scores in Physics of the secondary school students of Balasore district.
- The intelligence scores of the urban secondary school students of Balasore district influence significantly on their achievement scores in Physics.
- The intelligence scores of the rural secondary school students of Balasore district influence significantly on their achievement scores in Physics.
- The intelligence scores of the boys' secondary school students of Balasore district impact significantly on their achievement scores in Physics.
- The intelligence scores of the girls' secondary school students of Balasore district impact significantly on their achievement scores in Physics.

Summary and Conclusion:

The present investigation reveals that the intelligence is an important factor that significantly influences on the academic performance in Physics of the secondary school students. Intelligence of the secondary students enhances their learning ability and academic achievement. It also shows that the students having more intelligence are better in academic performance than that of others.

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