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Do High Self-estimates of Multiple Intelligences Predict High Academic Achievement at Secondary School Level?

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A study to find out self-estimates of multiple intelligences and their effect on grade 10th students' academic achievement was carried out. Data were collected randomly from 905 students' age group (15-17) through a multiple intelligences inventory. Data were analyzed using Mean, SD, Pearson Correlation and Stepwise Regression. Students rated their existential intelligence up to the high range, logical/mathematical, interpersonal, visual/spatial, intrapersonal, naturalistic, bodily/kinesthetic, and verbal/linguistic intelligence up to average range; they rated their musical intelligence up to the low range. Self-estimated logical/mathematical, verbal/linguistic, visual/spatial intelligence stood the top forecasters of students' academic achievement.

KeyWords: *Academic achievement, self-estimated intelligence, multiple- intelligence*

Introduction

Intelligence is a bio-psychological perspective, of handling information mentally and using them to handle a problem or to produce something which is valued in one or many cultures (Gardner, 1983, 1999, 2006). There are two schools of thought about intelligence. One of that believes that intelligence is not a single factor. There are various factors of intelligence (Sternberg, 1979, 1988, 1996). On another hand, the other school of thought believes that intelligence is one general entity "g" and through IQ test it can be measured (Stern, 1912; Binet and Simon, 1916), (as cited in Devis, 2000). According to Gardner theory (1983), a man has nine various bits of intelligence with different levels.

Theory of Multiple Intelligences

Gardner discussed the following intelligence in his theory:

Logical-mathematical intelligence: It is the capacity of a person to deal properly with mathematical, numerical and rational problems (Gardner, 1999).

Musical intelligence: This capability enables an individual to produce or compose music; comprehend sound, pitch and rhythm (Gardner, 1999).

Verbal-linguistic intelligence: It enables a person to practice language verbally or in a text efficiently and to achieve targeted objectives by using language (Mbuva, 2003).

Interpersonal intelligence: This capability enables an individual to recognize, appreciate, understand and manipulate feelings of other persons (Gardner, 1999).

Bodily-kinesthetic intelligence: It enables an individual to skillfully use different body organs in solving problems or to create valuable things. It also enables a

person to use different equipment expertly (Gardner, 2001).

Intrapersonal intelligence: It enables a person to realize his own feelings, temperaments, weakness and strength, interest and emotions and use them well (Gardner, 1999).

Existential intelligence: It is the capability which enables an individual to be sensitive towards the bigger questions about human existence.

Naturalistic intelligence: It enables an individual to comprehend natural phenomena, classify and recognize different living and non-living things on the basis of their common and specific characteristic (Gardner, 1999).

According to Eid and Alizh (2004) people are different from each other on basis of their cognitive capabilities and these are the indication of individual diverse multiple intelligences. For example, an individual may be with a great or extraordinary linguistic intelligence but low musical intelligence. This intelligence can be easily understood by identification of their roles in society with which they are associated (Davis, 2000). Effect of the self-estimated intelligence is evident in regard to performance in the academic achievements (Chamorro-Premuzic, et al., 2004). Self-estimation of intelligence influences an individual performance, motivation, confidence, behaviour, and outcomes. Hence this area of research is important (Dweck, 2000). Before the emergence of multiple intelligence theory, most of the previous researches focused on the approximation of general or overall intelligence "g". But MI theory has brought a revolution in education and studies were conducted on self-estimation of multiple intelligence. This area is very stimulating and interesting particularly with regard to students' academic achievement. But in Pakistan especially in Khyber Pakhtunkhwa, a minimum consideration was given to this topic, the researcher, therefore, was interested to find out: Do high self-estimate of multiple intelligences predict high academic achievement at the secondary level (Grade 10^{th}) in southern districts of Khyber Pakhtunkhwa. The core objective of this study was to determine the level of self-estimates of musical, bodily/kinesthetic, logical/mathematical, naturalistic, intrapersonal, existential, verbal/linguistic and interpersonal intelligences of students; to investigate the prediction power of students self-estimates of multiple intelligences on their academic achievement.

Hypotheses

1. Secondary school students have different estimates of their multiple intelligences.
2. High self-estimates of multiple intelligences predict high academic achievements.

Methodology

The secondary school students' multiple intelligences as estimated by them and their interplay with academic achievement was the main theme of this research. To collect data survey research design was used by the researcher.

Population

Khyber Pakhtunkhwa consists of 26 districts; D.I.Khan, Tank, Lakki Marwat, Bannu, Karak, Hangu, Kohat, are called southern districts. The population of this study included all the secondary school

students studying in public secondary schools of southern districts of Khyber Pakhtunkhwa.

Sample

There are total 421 (245 male + 176 female) working secondary schools in southern districts of Khyber Pakhtunkhwa. The strength of these schools is 10827 male and 7277 female students. Through proportion allocation technique total 115 schools (75 male + 40 female) and from these schools 905 students (542 male + 363 female were randomly selected.

The instrument of Data Collection

Thomas Armstrong (1994) inventory of multiple intelligences was used for data collection. This inventory defines Gardner's eight bits of intelligence (logical, musical, linguistic, visual, interpersonal, naturalistic and intrapersonal). To measure the intelligence Likert scale was used as per interval scale requirement. Armstrong has advised no scale option for his inventory. So the researcher used a standardized form 5-point Likert scale, "never" to "Always". It was developed on the basis of equal interval distribution and on the number of class/range "frequency" distribution "Very low range" to "Very high range". This scale best suited to the present study. Mc Kenzie inventory (1999) was used to describe Gardner's ninth existential intelligence. For a better understanding of the participants, with the permission of the author, the inventory was translated into Urdu.

The scale options and range used as a rule of thumb are as under:

Never= 1, Seldom= 2, Sometime=3, Often=4, Always=5.

Very low range = (1.00-1.50), Low range = (1.51-2.50), Moderate range= (2.51-3.50), High range = (3.51-4.50), Very high range = (4.51-5.00)

Validity of Instrument

The researcher has carefully made an identification of 72 items, their logical sequence and compilation, and then it was distributed among 15 research experts and 30 secondary school students so as to get their feedback on content validity. The thumb rule which was made by the researcher to accept or reject a statement was the 80% agreement of respondents on the four criteria (i) Importance of the item to the theme (intelligence) (ii) The item relevance to the local context (iii) Clarity (iv) Repetition. On the basis of repetition, irrelevancy, un-clarity and not attaining 80% agreement of respondents, 27 items were dropped out. After making relevant changes the tool consisted 45 items (Five items to describe each intelligence). It was piloted on a representative sample of 70 students (40 male and 30 female).

Reliability of Instrument

In order to find out the reliability of the data, it was processed through SPSS 24, the Cronbach Alpha values of inventory for different bits of intelligence were visual=.82, interpersonal=.91, logical=.92, bodily=.72, linguistic=.92 naturalistic=.83, existential=.88, intrapersonal=.82. The total reliability of the inventory was .84.

Data Collection & Data Analysis

Before the collection of data from respondents, the researcher sought permission of the heads of the institutions through a letter of request duly signed by researcher and the Director of Institute. The

letter carried the research title and purpose of the data collection and the researcher also provided surety that the collected data will not be used for any other purpose. The objective of data collection was also clarified to the respondents. On the spot willingness of the respondents were sought. All the students agreed to provide estimates of their nine multiple intelligences.

The marks obtained by the students in the last exam conducted by the board of intermediate and secondary examination were taken as their academic achievement. The researchers took these marks from DMCs, issued by their relevant boards with the permission of school principals. Mean, SD, Regression stepwise, Pearson Correlation was used by the researcher as statistical tests.

Results

Table 1

Self-estimates of multiple intelligences

S.NO	*Multiple Intelligences*	*N*	*M(SD)*
1	Existential intelligence	905	4.99(.72)
2	Interpersonal intelligence	905	3.65(.69)
3	Logical/Mathematical intelligence	905	3.56(.84)
4	Visual/Spatial Intelligence	905	3.54(.74)
5	Intrapersonal intelligence	905	3.52(.60)
6	Natural intelligence	905	3.42(.80)
7	Verbal/linguistic intelligence	905	3.33(.98)
8	Bodily/kinesthetic intelligence	905	3.06(.69)
9	Musical intelligence	905	2.06(.80)

The Mean rating of existential intelligence is indicating a higher self-estimate of this intelligence, in contrast to other self-estimates of intelligence. Other eight bits of intelligence except for musical Mean rating fall in the average (moderate range), while the self-estimate of musical intelligence mean rating falls in the lower range (2.06).

Table: 2

Pearson Coefficient of Correlation of Self-estimates of multiple intelligences and students' academic achievement (905)

S. No	Multiple Intelligences	r	P
1	Musical intelligence	.05	.340
2	Bodily/kinesthetic	.17	.000
3	Naturalistic intelligence	.21	.000
4	Intrapersonal intelligence	.24	.000
5	Existential intelligence	.28	.000

6	Interpersonal intelligence	.29	.000
7	Visual/Spatial intelligence	.36	.000
8	Logical/Mathematical intelligence	.48	.000
9	Verbal/Linguistic intelligence	.49	.000

Data analysis reveals that self-estimates of verbal/linguistic, logical/mathematical, visual/spatial intelligence are positive moderately correlated to students' academic achievement; self-estimates of interpersonal, existential, intrapersonal intelligence are positive modestly correlated to students' academic achievement; self-estimates of naturalistic and bodily/kinesthetic intelligence are positive weakly correlated to students' academic achievement; however self-estimate of musical intelligence is negligibly correlated to students' academic achievement.

Table 3

Stepwise Regression: Predicting intelligence of students' academic achievement (905)

		standardized coefficient							
Model		β	T	p	F	R	R^2	ΔR^2	f^2
1					169.15	.15	.39	.15	.18
	(Constant)		30.50	.00					
	Verbal/Linguistic	2.09	13.00	.00					
2					109.69	.44	.19	.19	.24
	(Constant)		24.18	.00					
	Verbal/Linguistic	.29	8.73	.00					
	Logical/mathematical	.22	6.51	.00					
3					78.01	.45	.20	.20	.25
	(Constant)		22.64	.00					
	Verbal/Linguistic	.31	9.25	.00					
	Logical/mathematical	.25	7.25	.00					
	Visual/Spatial	-.11	3.46	.00					

P<.05

Results of the stepwise Regression show that all three models are significant, but the third model carrying three variables verbal/linguistic, logical/mathematical and visual/spatial intelligence is the best model, it is responsible for 20% of the variance in the dependent variable. The Cohen (f^2) value of the 3rd model is .25 shows a small effect size, but significant at .05 level of significance. It also shows that in model 3rd a unit change in self-estimates of verbal/linguistic, logical/mathematical and visual/spatial intelligence predict 0.31, 0.25, and 0.11 units change respectively in academic achievement. Self-estimates of bodily/kinesthetic, interpersonal, musical, intrapersonal, existential, and naturalistic

intelligence were excluded as their P values were not significant and play no important role in the academic achievement. P>.05

Discussion

In the present study, the average value of the self-estimate existential intelligence fell in the range of high extent, whereas the bodily/kinesthetic, verbal/linguistic, visual/spatial, logical/mathematical, intrapersonal, interpersonal, and naturalist intelligence fell in the range of moderate range. However, the average value of musical intelligence fell in the range of low extent. In the present study, the respondents exhibited different estimates of their multiple intelligences along the MI inventory which indicates that they possessed multiple intelligences with different levels, therefore, the hypothesis no 1st of the study was confirmed. But as this study was about the self-estimates of multiple intelligences which may or may not be the actual measure of multiple intelligences so the results of this study may not be taken as confirmation or disconfirmation of the Gardner multiple intelligence theory (1983,1999,2006). A self-estimated difference of IQ is the cause of cultural differences it is universally admitted (Neto et al. 2009). Diversity exists in learners' strength of intelligence (Yuen & Furnham, 2005; Loori, 2005; Al-Faoury et al. 2011). For example in Farnham et. al study (2002) respondents estimate of their personal intelligence is high and artistic intelligence especially musical intelligence is low which partially supports the findings of this research study. Study of Yamanuchi (2015) reveals that musical intelligence is the students' highest intelligence follows by linguistic and interpersonal intelligence, while the logical/mathematical intelligence is the lowest self-estimated intelligence of the students. Franzen (2000) study suggested the students' self-estimate of naturalistic intelligence the highest and verbal intelligence is the lowest among the fifth, sixth and seventh-grade students. These are in contrast to the present study results. The differences among the results of the previous and present studies; the highest and lowest average score of the intelligence may be due to activities, opportunities and the availability of environment for the nourishment of the specific intelligence, compelled the participants to estimate their intelligence accordingly. Genetic and environmental influence on the self-assessed abilities has also been reported by (Bratko et al. 2012). Southern districts of Khyber Pakhtunkhwa are unprivileged and not fully developed areas students and teachers have rare chances and facilities to cultivate all the multiple intelligences. They have not up to date knowledge about advances in learning theories and teaching practices; so the respondents exhibited high estimate of existential intelligence and low and moderate estimates of other intelligence. The interesting point is that the estimates of verbal/linguistic and logical/mathematical which are more emphasized by our teachers' schools and assessment system did not get the highest mean score, needs further investigation.

The self-estimates of existential intelligence was found the highest and musical intelligence the lowest. According to Gardner (1999), existential intelligence is concerned with ultimate life issue. The main

reason for the highest estimate of the existential intelligence might be its relevance to the teaching of Islam. The respondents were Muslims and familiar with the concept of existential intelligence. Moreover, they also have more opportunities to develop existential intelligence the people of southern districts of Khyber Pakhtunkhwa are close to mosque and religion that's why they expectedly rated existential intelligence high. Their low estimate of musical intelligence is also due to cultural and religious reasons because music is generally considered undesirable in society and in the cultural norms of southern districts. Moreover due to lack of educational facilities in third world countries, musical and kinesthetic abilities are not given much importance (Furnham, et al., 2001), so the musical intelligence was estimated lower by the respondents compared to other intelligence. Hence the results of the present study are not astonishing.

The findings of this research study also revealed that students' self-estimated logical/mathematical, visual/spatial and verbal/linguistic intelligence are the substantial forecaster of their academic attainments. The 2nd hypothesis of the study was partially accepted. Furnham, Hoose & Tang (2002) reported that self-assessed spatial, logical, and verbal intelligence are best predictors of overall intelligence quotient score. Similarly, Ghazi et al. (2011) found an average association between students' academic achievement and self-estimates of verbal and logical intelligence. Siti. et al. (2013) also reported a significant positive relationship between students' perceived musical, logical/mathematical, verbal/ linguistic bodily/kinesthetic and academic attainments. The present study results are consistent with the above previous studies results. Such type of findings can also be a reflection of our traditional teaching as our schools focus their efforts more on logical/mathematical, visual/spatial and verbal/linguistic intelligence.

Conclusion

The findings of the study revealed that students rated their "existential intelligence up to high range; logical/mathematical, visual/spatial, verbal/linguistic, naturalistic, interpersonal and intrapersonal intelligence up to moderate range; and musical intelligence up to the low range. Higher self-estimates of logical/mathematical, visual/spatial, verbal/linguistic predict higher academic achievement".

Implication

Differences exist in term of self-estimates of multiple intelligences, but across the population, the hubris-humility effect also visible although it is not very durable; therefore schools should apply multiple intelligence methods teaching in classes. Hubris-humility effects can be reduced across the populace once the students are made/become aware of their different multiple intelligences (abilities); as self-belief contributes significantly in determining behaviour in term of self-enhancement. Multiple intelligence teaching also helps in eliminating the sense of inferiority and deprivation in female students which are caused by our cultural stereotypes. Therefore teachers should be provided training in Multiple Intelligence

Methods. It is essential for the school to create such a learning atmosphere in the classroom and school that is favourable for the development of different bits of intelligence of students in the class; by knowing their interest, needs and activating their various intelligence.

Teachers can guide the learners to use their most outstanding intelligence so as to enable them to understand their subject matter more efficiently. In this way, it would be easier for students to understand the course content through their strong intelligence. For example, the teacher can suggest that student with a strong musical intelligence can learn quickly about a war by making up a song about their heroes and their deeds.

Suggestions

To check the robustness of the finding of the study and to see whether self-estimates of multiple intelligences have an actual correlation with academic achievements the study can be replicated in different contexts, on different age groups, using different methods.

Limitations

This study is not an attempt to validate Gardner MI theory because it does need authentic and vigorous practical assessment. However, it is an attempt to better understand multiple intelligences, their self-estimates and how they can be correlated with academic achievement.

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