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Investigating Relationship Between Multiple Intelligences and Learning Styles of Elementary School Students

[1]Rabia Mansoor & [2]Syed Nasir Hussain
[1]FG School, New Cantt. Sargodha, Sargodha, Pakistan.
[2]Assistant Professor, Department of ECE & ETE, Faculty of Education, Allama Iqbal Open University Islamabad

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ABSTRACT

The main objective of the study was to investigate the relationship between Multiple Intelligences (MI) and Learning Styles (LS) of the elementary level students in district Multan. Rationale behind the study was to improve the learning environment of the classrooms by providing an insight to the teachers and educationists about LS of students and their preferences about MI. Design of the study was correlational and quantitative in nature. The population of study was students studying at elementary level in district Multan. Multistage sampling techniques were adopted to select a sample of 400 students. Data were collected through two research instruments i.e., a questionnaire named, MIs Profiling Questionnaire to investigate MI of the students and second questionnaire was Modified Version VARK LSs Scale used to identify the type of VARK LS of the students. It was concluded that for the components of MI, overwhelming respondents fell in ' above average' category then ' average' and 'below average' categories. The highest mean dimensions were ‘intrapersonal’ and the lowest by the musical dimension. While investigating learning styles among students it was found that 57.3 % of students preferred the bimodal LS. No significant relationship was found between dimensions of MI and LS. Based on the findings, it is recommended that teachers and educationists tailor their instructional strategies to accommodate the predominant intrapersonal intelligence among students, fostering a more personalized learning environment.

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1.0 Introduction

Intelligence has remained a focus of attention for centuries. It was conceptualized centuries ago by Plato and Aristotle. With the passage of time, the concept was redefined many times which transformed it from a simple to a complex phenomenon. From a simple one-folded concept to the theory of multiple intelligences, it has been worked at from different angles. Out of all intelligence theories so far, the theory of multiple intelligence is considered the most comprehensive one. In his MI theory, Gardner in the early 1980's, broadened the scope of intelligence theory by encompassing eight exclusively different areas. In simple words, it states that every human being uses different intelligences in one's daily routine life, and some intelligences are more prominent as compared to other intelligences. In this way, he propelled that different people learn and comprehend in different ways. The theory paved the way for alternative ways to classrooms with a more focus on offering content in multiple ways. Gardner (1983) was of the idea that as humans usually have more than one intelligence but anyone of them is his or her pronounced or dominant intelligence and it is easy for him to learn and comprehend while using that particular intelligence. Prior to this theory of intelligence, an earlier view of intelligence was prevailing that usually revolved around a two-factors concept of intelligence i.e., general intelligence and specific intelligence. It is believed that the area which has been affected the most by MI theory is education. It is a very vital contribution by Gardner to cognitive and learning sciences. It helped to understand the concept of individual differences in a different way and the approach to handle and deal with these individual differences.

Another important yet interesting concept is the learning style (LS). Mac Keracher (2004) has described it as:

The characteristic of cognitive, social, affective, and physiological behaviors that serve as relatively stable indicators of how learners think, interact with, and respond to the learning environment. (p.71)

Learning style may be conceptualized as the process by which people think, understand and process the information they get in different learning experiences. Brown (2000) identified four key learning styles i.e., visual learning, auditory learning, reading/writing, and kinesthetic learning. There are numerous research studies which have identified the relationship between multiple intelligences and learning styles of the students. The majority of them are related to language learning especially in acquisition of second or foreign language. This study does not delimit it to some specific subject or area but tried to investigate an overall relationship between these two important variables. Identification and knowledge about MI and LS may increase the understanding of one's strengths and weaknesses in learning.

Objectives of the Study

- To investigate MI(s) of elementary school students.
- To identify the type of VARK LS for elementary school students.
- To investigate the relationship between MIs and LS of elementary school students.

Research Questions

- It is expected that it will contribute a lot in the field of education. To achieve this goal, this study focuses to find answers to the following questions:
- What are the MI(s) possessed by elementary school students?
- What are the preferred LS (s) of Elementary school students?
- Does there exist any relationship between preferred LS of the participants and MIs?

2.0 Literature Review

As already mentioned, numerous studies have been conducted to investigate the relationship between multiple intelligences and learning styles. Further, it has also been observed that the majority of researchers have done it in relation to their subjects. For example, Eissa and Mostafa (2013) while studying it in the subject of Mathematics found that integration of MI and LS in teaching has proven very effective in problem solving and improved aptitude towards the subject. At the same time, we have several studies where this relationship is studied in different aspects of the teaching-learning process. Wilson (2018) has concluded that identification and integration of MI practices have a significant positive impact on classroom experiences. It was further found that the classes where MI is integrated in teaching have higher retention rate than the classes where traditional methods are used. Leasa, Corebima, and Ibrohim (2017) have found some very interesting facts while studying LS of the students. They concluded that the students with kinesthetic learning style have a higher emotional intelligence than the students with other learning styles.

Integrating MI approach in classroom means to offer multiple learning experiences to the students, and the ultimate result is the creation and development of a student-centered environment in the classroom. Lesson plans based on the integration of MI provide a vast range of learning activities and increase students' motivation and polish their skills and potentials (Davis, 2017; Madkour & Mohamed, 2016). Siphai and Kratoorerk (2017) an increase of MI practices in the classroom and MI capabilities of the students can result in multiple positives among the students e.g., logic, mathematics, bodily movements, physical activities, better human relationships, love for natural environments and higher level of existence.

Yaumi, Sirate, and Patak (2018) noticed that MI-based instructions, supervising the implementation of student-centered learning, designing student-centered approach has vital contribution on MI development and Widiana. Jampel (2016) observed that the adoption of MI approach improved the students' creative thinking and achievement in learning. Students' LS, after controlling other variables, have connection with academic performance. Anbarasi et al, (2015) observed that teaching methods adopted to students' LS has improved their comprehension, achievement, and retrieval of the subject. Dueñas and Fredy (2013) observed that students' interests are very crucial in developing a positive attitude towards learning as well as enhancing students' MI. Elban (2018) concluded that the LSs of pre-service teachers resulted in their higher academic achievements, but these results are not conclusive as there are studies which have found no relationship between students' learning styles and their overall academic achievement (For Example Rorie, William & Frank, 2003).

Furthermore, many studies have targeted some specific intelligences given by Gardner and their relationship with other learning variables have been found. For example, a strong positive relationship between students' intrapersonal intelligence and their meta cognitive strategies was found by Sistani and Hashemian (2016). Similarly, students with dominant intrapersonal and linguistic intelligences have shown higher level of learners' efficacy (Moafian & Ebrahimi, 2015). Another study found that there is a negative correlation between mathematical intelligence and students' self-efficacy (Cheema & Kitsantas, 2016).

Storek and Furnham (2013) observed that mindset beliefs were not overwhelmingly related to MI test scores, Azid, Yaacob, and Shaik- Abdullah (2016) observed favorable responses towards the modular enrichment activities and the inclusion of MI on improving each MI profile.

Some other aspects of MIs and LSs are also studied by research around the world which have some very interesting results. No significant interaction was found between the visualization and LSs by Rusli and Nagara (2017). Similarly, no significant effect of proficiency level on application of MI was observed by Ebadi and Beigzadeh (2016). We have earlier mentioned that MI has been studied in context of different subject especially with the language acquisition. But several empirical evidence tells that the relationships between MI and foreign language acquisition are complex and interactive in nature (Savas, 2012). Information about MIs and LSs is another important area to be studied. For example, it was found that information literacy training did increase students' performance in their project work (Intan, Shaheen & Schubert, 2008).

3.0 Methodology

Research Design

This study was quantitative and correlational in nature as it was to investigate relationships between MIs and LSs of the elementary school students. It was based on the MI theory of Howard Gardner where each variable of intelligence was worked out with numbers and analyzed according to statistical procedures.

Population

Students (male & female) studying at elementary level of school education in district Multan was population of the study. According to the data received from the Chief Executive Officer (Education) district Multan, there were 591 male and 647 female schools in Multan where elementary classes i.e., 6 to 8 were in progress. Students studying in session 2019-2020 in grades VI, VIII and VIII were included in the current study.

Sampling Techniques

Multistage sampling technique was adopted to take required sample of the study. In first stage the cluster sampling was used by taking total male and female government elementary schools of district Multan. In the second stage the study was confined to 10 schools (5 male & 5 female). In the third stage, sample was randomly selected from both male and female schools. The target was to collect data from 400 students (200 males and 200 females) excluding sample for pilot study. Participation in the study was on a voluntary basis. The researcher herself visited the classrooms and explained the nature of research to them. After that, students were asked to either participate or refuse their participation in the study.

Research Instruments

In the present study two questionnaires were used to investigate MIs and LSs of the elementary school students in district Multan.

MIs Profiling Questionnaire MIPQ-VII

The MIs Profiling Questionnaire VII (MIPQ-VII) is a five-point Likert scale self-rating survey which depends on Howard Gardner's MIs theory. The MIPQ-VII measures seven components. The instrument contains 28 items on a Likert-scale from 1 (Strongly Disagree) to 5 (Strongly Agree).

Scoring Criteria

Table 1: Levels of Students' Scores on MIPQ-VII

Levels	Score Range
Above Average Level	3.6 – 5
Average Level	2.1 – 3.5
Below Average Level	0 – 2
Total	0 – 5

Modified Version VARK LSs Scale

VAK LS scale was created by Ld. Pride Company (2004). VARK LSs scale comprises of 16 items. Each question has four potential choices. VARK LSs scale first time made by clinicians and experts. VARK idea was initially focused on instructing early grades youngsters. Early VARK experts thought that individuals learn in different ways. As unusually basic model, a kid who may not learn letter and word by perusing could learn more efficiently by following letter shapes with their finger.

4.0 Findings and Results

Table 2: Reliability Analysis of the MIPQ-VII Questionnaire

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.800	.815	28

Table No 2 showed high internal consistency by Cronbach's Alpha was calculated at 0.815 of items included in questionnaire which show higher level of internal consistency of the research instrument.

Table No 3: Correlations among dimensions of Multiple Intelligences

		LING	LM	SP	BK	MU	INTER	INTRA
LING	Pearson Correlation	1						
	Sig. (2-tailed)							
	N	225						
LM	Pearson Correlation	.117	1					
	Sig. (2-tailed)	.080						
	N	225	225					
SP	Pearson Correlation	.049	.257**	1				
	Sig. (2-tailed)	.461	.000					
	N	225	225	225				
BK	Pearson Correlation	.225**	.096	.006	1			
	Sig. (2-tailed)	.001	.153	.924				
	N	225	225	225	225			
MU	Pearson Correlation	.033	.073	.088	.144*	1		
	Sig. (2-tailed)	.620	.277	.190	.030			
	N	225	225	225	225	225		
INTER	Pearson Correlation	-.093	.010	-.037	.011	.051	1	
	Sig. (2-tailed)	.165	.887	.584	.874	.445		
	N	225	225	225	225	225	225	
INTRA	Pearson Correlation	.174**	.186**	.164*	.181**	.130	.076	1
	Sig. (2-tailed)	.009	.005	.014	.007	.051	.255	
	N	225	225	225	225	225	225	225

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3 showed that correlation between Logical Mathematics and Linguistic was weak (r = 0.117), correlation between Spatial Intelligence and Linguistic was found weak (r = 0.049), Correlation between Spatial intelligence and Logical mathematics was small (value of r = 0.0257), correlation between Bodily Kinesthetic and Linguistic was small (where r = 0.225), between bodily kinesthetic and logical mathematics was weak (where r = 0.096), between bodily kinesthetic and spatial intelligence was weak (where r = 0.006), between music and linguistic was weak (where r = 0.033), between music and logical mathematics was weak (where r = 0.073), between music and spatial was found weak (where r = 0.088), between music and bodily kinesthetic was small (where r = 0.144 at Alpha level of 0.05), between interpersonal intelligence and linguistic was found weak negative relationship (where r = -0.093 at alpha level of 0.01), between interpersonal intelligence and logical mathematics was found weak positive relationship (where r = 0.010 at alpha level of 0.01), between interpersonal and spatial intelligence was found weak negative relationship (where r = -0.037), between interpersonal and bodily kinesthetic was found weak positive relationship (where r = 0.011), between interpersonal and music intelligence was found

weak positive relationship (where r = 0.051), between intrapersonal and linguistic intelligence was found small (where r = 0.174 at alpha level of 0.01), between intrapersonal and logical mathematics was found small (where r = 0.186 at alpha value of 0.01), between intrapersonal and spatial intelligence was found small (where r = 0.164 at alpha level 0.01), between intrapersonal and bodily kinesthetic intelligence was found small (where r = 0.181 at alpha level of 0.01), between intrapersonal and music intelligence was weak positive relationship (where r = 0.130), and between intrapersonal and interpersonal intelligence was also found weak (where r = 0.076).

Reliability Analysis of the VARK Questionnaire

Table 4: *Reliability Analysis of the Questionnaire (VARK)*

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.668	.674	16

Table 4 showed reliability analysis of the questionnaire (VARK) with Cronbach Alpha value of 0.668 which showed internal consistency of the items.

Results of Descriptive Statistics Related to Multiple Intelligences

The data collected was recorded as per scoring criterion on the basis of scores. The data about scores of the students attained in different Sub-Sections of MI Profiling Questionnaire VII was uploaded to the computer and arranged in the tables. The students were distributed in three categories i.e. Below Average, Average and Above Average as shown below:

Table 5: Distribution of students for different components of MI according to scores attained on MI Profiling Questionnaire

Components	Levels of the students					
	Below Average		Average		Above Average	
	f	%	f	%	f	%
Linguistic	21	9.3	35	15.6	169	75.1
Logical-Mathematical	8	3.6	32	14.2	185	82.2
Spatial	13	5.8	56	24.9	156	69.3
Bodily-kinesthetic	20	8.9	53	23.6	152	67.6
Musical	66	29.3	60	26.7	99	44.0
Interpersonal	61	27.1	77	34.2	87	38.7
Intrapersonal	9	4.0	19	8.4	197	87.6

f = Number of students out of 225 (Sample taken for the study).
% = Percentage of the students falling in each category.

Table 5 shows levels, i.e. above average, average and below average, of all the components of MI. For all the components of MI, overwhelming respondents was falling in ' above average', then '

average' and 'below average' categories.

Table 6: Results of Descriptive Statistics Related to VARK Learning Styles

Single Modal		Bi-Modal		Tri-Modal		Multi-Modal	
V	(n=6)	VA	(n=20)	VAR	(n=4)	VARK	(n=5)
A	(n=2)	VR	(n=15)	VAK	(n=35)		
R	(n=6)	VK	(n=51)	ARK	(n=12)		
K	(n=8)	AR	(n=7)	VRK	(n=18)		
		AK	(n=23)				
		RK	(n=13)				
	(n=22)		(n=129)		(n=69)		(n=5)

Table 6 reflects that 9.8 % of the students opted a single modal LS. Among the single modals, students opted kinesthetic (K) then visual (V) & Reading (R). Approximately 36% of students opted the K-LS. Aural style was seen as least popular single modal. Among the bimodal LS (57.3 % of the students), approximately 40% of students opted visual with kinesthetic. About 30.7% of the students choose a tri-modal LS, among the tri-modal students 51% opted VAK model. Only 2.2% of the students liked the multimodal LS i.e. VARK modal.

Relationship between MI and LS of Students at Elementary Level

Table 7: Relationship between MI(s) and LS

		Visual	Auditory	Reading/ Writing	Kinesthetic
Linguistic Intelligence	Pearson Correlation	-.041	-.068	-.012	.101
	Sig. (2-tailed)	.546	.310	.858	.131
	N	225	225	225	225
Logical Mathematics Intelligence	Pearson Correlation	-.007	.056	-.059	.011
	Sig. (2-tailed)	.913	.404	.378	.871
Spatial Intelligence	Pearson Correlation	-.031	-.092	.016	.088
	Sig. (2-tailed)	.645	.169	.806	.189
Bodily Kinesthetic Intelligence	Pearson Correlation	.023	-.011	-.050	.031
	Sig. (2-tailed)	.728	.867	.451	.649
Musical Intelligence	Pearson Correlation	.061	-.123	-.037	.075
	Sig. (2-tailed)	.359	.066	.584	.262
Interpersonal Intelligence	Pearson Correlation	-.048	.004	.090	-.035
	Sig. (2-tailed)	.471	.958	.180	.603
Intrapersonal Intelligence	Pearson Correlation	.009	-.013	-.057	.050
	Sig. (2-tailed)	.898	.842	.397	.451

Table 7 reflects relationship between Linguistic and Visual “r = -0.041”, Linguistic and

Auditory showing "r = -0.068", Linguistic and Reading/ writing shows "r= -0.012", and Linguistic and Kinesthetic showing "r= 0.101". Relationship between Logical mathematics and Visual "r = -.007", Logical mathematics and Auditory showing "r = .056", Logical mathematics and Reading/ writing shows "r= -.059", and Logical mathematics and Kinesthetic showing "r= .011". Relationship between Spatial and Visual "r = -.031", Spatial and Auditory showing "r = -.092", Spatial and Reading/ writing shows "r= .016", and Spatial and Kinesthetic showing "r= .088". Relationship between Bodily Kinesthetic and Visual "r = .023", Bodily Kinesthetic and Auditory showing "r = -.011", Bodily Kinesthetic and Reading/ writing shows "r= -.050", and Bodily Kinesthetic and Kinesthetic showing "r= .031". Relationship between Musical and Visual "r = .061", Musical and Auditory showing "r = -.123", Musical and Reading/ writing shows "r= -.037", and Musical and Kinesthetic showing "r= .075". Relationship between Interpersonal Intelligence and Visual "r = -.048", Interpersonal Intelligence and Auditory showing "r = .004", Interpersonal Intelligence and Reading/ writing shows "r= .090", and Interpersonal Intelligence and Kinesthetic showing "r= -.035". Relationship between Intrapersonal Intelligence and Visual "r = .009", Intrapersonal Intelligence and Auditory showing "r = -.013", Intrapersonal Intelligence and Reading/ writing shows "r= -.057", and Intrapersonal Intelligence and Kinesthetic showing "r= .050". Overall, there was no visible relationship found between various MI and any of the four LSs i.e. visual, auditory, reading/writing and kinesthetic.

5.0 Discussion and Conclusion

MI theory as it was published in 1983 by the Howard Gardner, proposed that every individual has eight types of intelligences including Linguistic, Logical Mathematics, Bodily Kinesthetic, Spatial, Music, Interpersonal, Natural and Intrapersonal Intelligence. If we want to give example, then we can say individual having spatial or musical intelligence must be encourages for improving their particular capabilities. Gardner suggested that all types of MIs must be measured for assessment of abilities.

The social setting of capacities was likewise underlined by Gardner. Each culture has specific insights. In conclusion he expressed the standards of the MI Theory: Individuals ought to be spurred to involve their favored insights in learning, instructional exercises ought to relate to various types of knowledge and assessment of learning ought to gauge numerous types of insight. Keeping in view the significance of acknowledgment of prevailing knowledge during early pre-adulthood, a need was considered to lead a review for exploring the connection between numerous insights and LSs of the students learning at elementary level in local Multan.

The study investigated the preference of the students in their MIs and LSs which may help to know students strong and weak areas. Teachers may also come to know the best way to teach as per recognized LSs of the students and it may increase their professionalism. Two questionnaires have been used which were standardized as formal permission was taken to use them into research work. To compare the internal consistency of the items, and demographics like location and area, the reliability was checked by taking sample of 20 students excluding the rest of the sample who were not included in the data which have been used in the rest of the analysis. Comparison between the males and females' preferences in MIs was checked. Different situations of the result came

into notice when preferences of the students were checked for their MIs and LSs. In some intelligence, females were better as compared to the males.

Conclusions

The study was aimed to investigate the relationship between MIs and LSs of the students studying at elementary level in district Multan. The study was based on MI theory given by Dr. Howard Gardner. The participants showed their responses given against seven different types of MIs. After studying findings of study of the current study, the researcher has concluded the following:

1. For all the components of MI, overwhelming respondents fell in the ‘above average' category of performance, followed by ' average' and 'below average'. Students found keen interest while talking to the researcher that it was a new experience for them, and they found new opportunities to show their preferences about the different types of intelligence.
2. The mean values of dimensions varied from a lot. The highest demonstrated by the ‘intrapersonal’ dimension and the lowest by the musical dimension.
3. Gender differentials were observed between the mean scores of the students on MI dimensions “Linguistic Intelligence”, “Logical-Mathematical Intelligence” and “Intrapersonal Intelligence”. For female students the mean performance was better than for male students. It was clear from the given preferences of the boys and girls on the MI Scale, that gender differences play role in the development of some of the intelligences whereas others are independent of gender differences.
4. 4.0 While investigating the LS of the students, it was found that few students liked a single modal learning style. Among the single modals, students favored kinesthetic (K) followed by visual (V) & Reading (R). Approximately one third of the students preferred the K-learning style. Aural style was seen as the least popular single modal.
5. Among the bimodal LS, approximately slightly less than half of students preferred visual with kinesthetic.
6. About one third of the students chose a tri-modal LS, among the tri-modal students half preferred VAK model.
7. Few of the students liked the multimodal learning style i.e., VARK modal.
8. While comparing the students’ VARK Ls scores on gender basis, female students mostly preferred a bi-modal learning style followed by a tri-modal. Approximately half of the male students found bimodal as their preferred learning style.
9. Multi-modal was the least preferred LS by both boys and girls.
10. As per the results of this study no significant relationship exists between all the dimensions of MI and LS.

Recommendations

There are some recommendations which have been deduced keeping in view the conclusion:

1. With the trends of increasing technology, development of different websites is recommended for knowing each type of MI and LS of the students for different levels.
2. It is recommended that organizations arrange seminars, workshops, fairs regarding

awareness of the MI and LSs of the students so that parents may come to know about their children.

3. VARK LS is an efficient tool for accessing students' preferred LS. As seen that a bi-modal LS is preferred within students, a need has been felt to explore the teaching strategies and evaluate the effectiveness. Education systems both in public and in private sectors need to assume teaching methodology according to the preferred LS of students.

VARK questionnaire results may fetch substantial development in the learning process and teaching. Teachers may utilize the questionnaire to know the LS of students to bridge gap between teaching and learning at all levels.

Rabia Mansoor: Problem Identification and Theoretical Framework
Syed Nasir Hussain: Data Analysis, Supervision and Drafting

Conflict of Interests/Disclosures

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