Assessment of Multiple Intelligence (MI) Among Secondary School Students: Influence of Select Demographic Factors

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Abstract -The theory of multiple intelligences, introduced by Harvard developmental psychologist Howard Gardner in 1983, proposes that human intelligence can be categorized into distinct modalities. These modalities include visual-spatial, verbal-linguistic, musical-rhythmic, logical-mathematical, interpersonal, intrapersonal, naturalistic, and bodily-kinesthetic intelligences. Unlike traditional notions of a singular intelligence quotient (IQ), the theory of multiple intelligences recognizes that individuals possess diverse ways of learning. In the present study an attempt is made to assess the multiple intelligence of the students studying in secondary schools and influence of demographic variables on MI. A total of 1697 students were randomlty selected from the Mysuru district selected using simple random sampling. They were administered Multiple Intelligences Scale (MIS) is a tool developed by SurabhiAgarwal and Suraksha Pal (2017). The data were subjected to chi-square tests and results revealed that majority of the sample size has average levels of intelligence in all of the dimensions (Linguistic, Logical, Spatial, Naturalistic, Interpersonal, Intrapersonal). Comparatively, interpersonal multiple intelligence was highest and Intrapersonal multiple intelligence was the least.Female secondary students had the highest levels of multiple intelligence.Age and family type of secondary students did not have significant influence in multiple intelligence. Students from urban area had higher levels of multiple intelligence than students from rural area.

Keywords: Multiple intelligence, secondary school students, demography

INTRODUCTION

According to Gardner, the human brain has evolved to be responsive to various types of content in the world, resulting in different intelligences. Multiple intelligences encompass a wide range of learning approaches, including the use of words, numbers, pictures, music, social interactions, introspection, physical movement, and a connection with nature. Understanding which types of intelligence a student possesses can assist educators in adapting their teaching styles and suggesting suitable career paths.

Despite its popularity, the theory of multiple intelligences has faced criticism from psychologists and educators. Some argue that the intelligences proposed by Gardner merely represent innate talents and abilities rather than distinct forms of intelligence. Additionally, cognitive psychologists contend that there is a lack of empirical evidence supporting the validity of this theory.

Gardner's theory of multiple intelligences has been the subject of extensive analysis and discussion within educational research. Morgan (1996) critically examined Gardner's theory, exploring its conceptual foundations, implications for education, and potential limitations. The study provided valuable insights into the theory's strengths and weaknesses, highlighting the need for further empirical research to establish its validity. Almeida et al. (2010) explored the application of Gardner's multiple intelligence theory as an alternative approach to intelligence assessment. They emphasized the importance of considering a broader range of intelligences beyond traditional measures of intelligence, such as IQ tests. The study suggested that incorporating multiple intelligences into assessment strategies could provide a more comprehensive understanding of individuals' cognitive abilities and potential. Barrington (2004) focused on the practical implications of Gardner's theory in higher education. The author highlighted how understanding students' different intelligences can inform instructional strategies that cater to diverse learning styles. The

study emphasized the importance of employing varied methods, activities, and assessments to enhance student learning and confidence in areas where they may have previously struggled.

Adcock (2014) examined the longevity of multiple intelligence theory in education and its continued relevance in contemporary classrooms. The author discussed the theory's impact on teaching practices and curriculum development, emphasizing the need for educators to recognize and nurture students' unique intelligences to promote meaningful learning experiences. Shearer and Karanian (2017) delved into the neuroscience of intelligence and investigated the empirical support for Gardner's theory. They explored neuroscientific findings related to different aspects of intelligence, shedding light on the neural mechanisms underlying various intelligences proposed by Gardner. The study highlighted the potential connections between neuroscience and multiple intelligence theory, suggesting avenues for future research in this area.

In contrast, Ferrero, Vadillo, and León (2021) raised concerns about the methodological quality of intervention studies examining the theory of multiple intelligences. They emphasized the need for rigorous research designs and valid evaluation methods to establish the effectiveness of interventions based on this theory. The study emphasized the importance of addressing methodological limitations to strengthen the empirical foundation of multiple intelligence theory.

Howard Gardner's theory of multiple intelligences, proposed in 1983, has found practical applications in various aspects of education, including curriculum development, instructional planning, and the selection of course activities and assessments. According to Gardner, individuals possess unique strengths and weaknesses across different intelligences, which prompts educators to tailor their teaching methods to suit the subject matter and the specific needs of their students.

By recognizing the diverse range of intelligences, educators can incorporate a variety of approaches to instruction, thereby enhancing students' learning experiences. This approach allows students to develop confidence in areas where they may initially be weaker, as they are provided with multiple opportunities to engage with the material using their preferred intelligence. For example, a student with high musical-rhythmic intelligence may benefit from incorporating music or rhythm into the learning process, while a student with strong interpersonal skills may excel in collaborative activities.

Gardner's theory has significantly influenced the field of education by highlighting the importance of accommodating diverse learning styles and abilities. It has encouraged educators to move away from a one-size-fits-all approach and instead consider the individual strengths and interests of their students. By incorporating diverse and meaningful approaches to instruction, teachers can create a more inclusive and engaging learning environment.

While the theory of multiple intelligences has generated debate and critical analysis, several studies have shed light on the potential benefits of its implementation in educational settings. Incorporating multiple intelligences into teaching practices, curriculum design, and assessment strategies has been shown to enhance students' motivation, engagement, and overall learning outcomes. It allows students to make connections between different subjects and apply their strengths to various areas of study.

However, it is important to note that the validity and practical implications of Gardner's theory continue to be subjects of scholarly inquiry. Further empirical research and methodological rigor are necessary to establish a robust foundation for its application in educational contexts. Ongoing studies should explore the relationship between the different intelligences and academic achievement, as well as investigate effective strategies for incorporating multiple intelligences into existing educational frameworks.

Keeping this as the background, this study was designed and this paper is titled as:

Method:
In our correct investigation, each of the 1697 samples from secondary school were tested with Multiple Intelligence Scale, ranging over 6 different dimensions.

Sampling:
Normative survey was employed and the data have been collected from a sample of 200 secondary School Boys and Girls of IX class, Mysore, using random sampling technique for conducting pilot study.

The questionnaires were distributed to the students of IX std and necessary instructions were given. The

students filled in the personal data sheet first and then the M.I scale. The students took 30 – 40 mins to fill in the questionnaire.

Research Design:

The data collected was scored, checked for inconsistencies and computerized. Quantitative analysis of data has been carried out using the statistical software, "Statistical package for Social Sciences" (SPSS Version. 10. 0).

TOOL FOR THE STUDY

Multiple Intelligence Scale:

The Multiple Intelligences Scale (MIS) is a tool developed by SurabhiAgarwal and Suraksha Pal in 2017 to assess multiple intelligences in high school students aged 14-18. The scale consists of 60 multiple-choice questions divided into six sections that are taken into consideration corresponding to different intelligences: Verbal-Linguistic, Logical-Mathematical, Visual-Spatial, Naturalistic, Interpersonal, and Intrapersonal. There is also a section for Existential intelligence, although it is not clear if it is included in the scale.

The scale uses a five-point rating system (Always, Mostly, Often, Rarely, Never) to measure the extent to which students possess specific intelligences. Each response is assigned a score ranging from 1 to 5 (Always = 5, Mostly = 4, Often = 3, Rarely = 2, Never = 1). The weightage of the marks varies depending on the question.

The reliability of the MIS was assessed using test-retest and split-half methods. The test-retest reliability coefficient was found to be 0.71, indicating a moderate level of stability over time. The split-half reliability coefficient was 0.83, suggesting a high degree of internal consistency. These reliability coefficients were reported to be statistically significant at the 0.01 level.

The purpose of the MIS is to assess and profile an individual's cognitive strengths and weaknesses across multiple intelligences. The scores obtained can help individuals identify their natural intelligences and focus on learning and work activities that align with their strengths. The scale does not aim to label learners but rather empower them.

Statistical analysis

The collected data has been analyzed to determine frequencies using the chi-square test. The results of this analysis have been tabulated and interpreted. Table 1 & Table 2 displays the results of the scores analyzed using the Multiple Intelligence Scale.

RESULTS

Table 1 displaying the levels of Multiple Intelligence of Secondary School Students

Dimensions of MI	Levels					
	Low		Medium		High	
	Frequency	%	Frequency	%	Frequency	%
Linguistic	321	18.9	1157	68.2	219	12.9
Logical	315	18.6	1166	68.7	216	12.7
Spatial	331	19.5	1117	65.8	249	14.7
Naturalistic	308	18.1	1158	68.2	231	13.6
Interpersonal	308	18.1	1116	65.8	273	16.1
Intrapersonal	307	18.1	1243	73.2	147	8.7
Total	272	16	1199	70.7	226	13.3

Overall, 16% of the total population reported having low levels of multiple intelligence, while the majority of students (70.7%) fell into the medium level category. A smaller percentage (13.3%) reported having high levels of multiple intelligence.

In terms of specific dimensions, linguistic intelligence had 18.9% of participants reporting low levels, while the majority (68.2%) fell into the medium level category, and 12.9% reported high levels of linguistic intelligence. Similarly, logical intelligence had 18.6% reporting low levels, 68.7% in the medium level, and 12.7% in the high level category. For spatial intelligence, 19.5% reported low levels, 65.8% reported medium levels, and 14.7% reported high levels. In the case of naturalistic intelligence, 18.1% reported low levels, 68.2% reported medium levels, and 13.6% reported high levels. Interpersonal intelligence showed that 18.1% of participants

reported low levels, 65.8% reported medium levels, and 16.1% reported high levels. Intrapersonal intelligence had 18.1% reporting low levels, 73.2% in the medium level, and 8.7% in the high level category. This indicates that the majority of secondary school students in this study fall into the medium range of multiple intelligence in all dimensions. This suggests that most students possess average levels of intelligence across various domains. While a portion of students reported low or high levels of intelligence in specific dimensions, the majority fall into the medium category, indicating a balanced distribution of multiple intelligence among the participants.

Table 2 showing the levels of Multiple intelligence by various demographic variables and results of chi-square test.

Variable	Sub variable		Levels			X^2 and P
			Low	Medium	High	
Gender	Male	Frequency	163	497	91	X^2=32.36; P=.001
		Percent	21.7%	66.2%	12.1%	
	Female	Frequency	109	702	135	
		Percent	11.5%	74.2%	14.3%	
Age (in years)	13	Frequency	6	20	7	X^2=10.163; P=.118
		Percent	18.2%	60.6%	21.2%	
	14	Frequency	126	516	113	
		Percent	16.7%	68.3%	15.0%	
	15	Frequency	129	585	90	
		Percent	16.0%	72.8%	11.2%	
	16	Frequency	11	78	16	
		Percent	10.5%	74.3%	15.2%	
Type of family	Nuclear	Frequency	202	852	159	X^2=1.279; P=.527
		Percent	16.7%	70.2%	13.1%	
	Joint	Frequency	70	347	67	
		Percent	14.5%	71.7%	13.8%	
Domicile	Urban	Frequency	237	949	187	X^2=32.36; P=.001
		Percent	17.3%	69.1%	13.6%	
	Rural	Frequency	35	250	39	
		Percent	10.8%	77.2%	12.0%	

Gender: In terms of gender differences, the data indicate that among male respondents, 21.7% reported low levels of multiple intelligence, while 66.2% reported medium levels, and 12.1% reported high levels. Among female respondents, 11.5% reported low levels, 74.2% reported medium levels, and 14.3% reported high levels. A chi-square test was conducted to examine the relationship between gender and levels of multiple intelligence, revealing a significant difference (X^2 = 32.36, p = .001). This indicates that there is a statistically significant association between gender and the reported levels of multiple intelligence among the participants.

Age: In terms of age differences, the data indicate that among 13-year-old respondents, 18.2% reported low levels of multiple intelligence, while 60.6% reported medium levels, and 21.2% reported high levels. Among 14-year-olds, 16.7% reported low levels, 68.3% reported medium levels, and 15.0% reported high levels. Among 15-year-olds, 16.0% reported low levels, 72.8% reported medium levels, and 11.2%

reported high levels. Among 16-year-olds, 10.5% reported low levels, 74.3% reported medium levels, and 15.2% reported high levels. A chi-square test was conducted to examine the relationship between age and levels of multiple intelligence, revealing a non-significant difference (X^2 = 10.163, p = .118). This indicates that there is no statistically significant association between age and the reported levels of multiple intelligence among the participants.

Type of family: The data regarding the influence of the type of family reveal that among respondents from nuclear families, 16.7% reported low levels of multiple intelligence, while 70.2% reported medium levels, and 13.1% reported high levels. Similarly, among respondents from joint families, 14.5% reported low levels, 71.7% reported medium levels, and 13.8% reported high levels. To examine the relationship between the type of family and levels of multiple intelligence, a chi-square test was conducted. The results of the test revealed a non-significant difference (X^2 = 1.279, p = .527). This suggests that

there is no statistically significant association between the type of family and the reported levels of multiple intelligence among the participants.

Domicile: The data regarding the influence of the domicile indicate that among respondents from urban areas, 17.3% reported low levels of multiple intelligence, while 69.1% reported medium levels, and 13.6% reported high levels. Similarly, among respondents from rural areas, 10.8% reported low levels, 77.2% reported medium levels, and 12.0% reported high levels. A chi-square test was conducted to examine the relationship between the domicile and levels of multiple intelligence. The results of the test revealed a non-significant difference ($X^2 = 32.36$, p = .001). This indicates that there is no statistically significant association between the domicile and the reported levels of multiple intelligence among the participants.

DISCUSSION

Major Findings:
- Majority of the sample size has average levels of intelligence in all of the dimensions (Linguistic, Logical, Spatial, Naturalistic, Interpersonal, Intrapersonal)
- Comparatively, interpersonal multiple intelligence was highest and Intrapersonal multiple intelligence was the least.
- Female secondary students had the highest levels of multiple intelligence.
- Age and family type of secondary students did not have significant influence in multiple intelligence.
- Students from urban area had higher levels of multiple intelligence than students from rural area.

The findings from the analysis of the sample suggest several key observations regarding multiple intelligence dimensions, gender differences, age and family type influences, and the impact of urban versus rural settings. These findings can be discussed in light of relevant studies to provide a comprehensive understanding.

The majority of the sample in the present study exhibited average levels of intelligence across various dimensions, including linguistic, logical, spatial, naturalistic, interpersonal, and intrapersonal. This finding is in line with the concept of multiple intelligences proposed by Gardner (Morgan, 1996;

Almeida et al., 2010). According to Gardner's theory, intelligence is not limited to a single measure but encompasses different modalities, allowing individuals to excel in various cognitive domains. The literature supports the notion that individuals possess a balanced distribution of multiple intelligences.

Studies such as Pursun and Efilti (2019), Vebrianto et al. (2020), and Yildiz et al. (2020) have explored the dimensions of multiple intelligences and their implications for understanding cognitive abilities and learning preferences. These studies have reported similar findings, indicating that individuals generally demonstrate average levels of intelligence across linguistic, logical, spatial, naturalistic, interpersonal, and intrapersonal dimensions. The findings from these studies align with the present study's results, providing further evidence for the prevalence of balanced intelligence profiles in individuals. This suggests that individuals have the potential to excel in multiple areas of intelligence, highlighting the importance of recognizing and nurturing these diverse intelligences within educational settings.

The analysis of the data also revealed that among the sample, the interpersonal dimension of multiple intelligence had the highest level, while the intrapersonal dimension had the lowest level. This finding indicates that the participants in the study show a greater inclination towards social interactions and understanding others' perspectives, while they may have relatively weaker skills in self-reflection and self-awareness. The literature, particularly the study conducted by Morgan (1996), supports these findings by highlighting the concept of individual variations in multiple intelligences. Morgan's analysis suggests that individuals may exhibit different strengths and weaknesses across various intelligence dimensions. In this case, the higher level of interpersonal multiple intelligence aligns with the participants' greater emphasis on social interactions and understanding others.

Additionally, the study conducted by Pursun and Efilti (2019) provides further support for these findings, as they reported similar results regarding the higher level of the interpersonal dimension and the lower level of the intrapersonal dimension among participants. This consistency in findings across studies suggests that the observed pattern of higher interpersonal intelligence and lower intrapersonal intelligence is not specific to the present study but reflects a broader trend. These

findings emphasize the significance of recognizing and fostering different dimensions of intelligence within educational settings. The study by Barrington (2004) &Yavichet. al. (2020) highlights the importance of incorporating the theory of multiple intelligences into teaching practices to accommodate and nurture diverse intelligence profiles. By acknowledging individual strengths and weaknesses in different intelligence dimensions, educators can tailor their instructional strategies and create learning environments that cater to students' unique needs.

The findings of the study suggest that female secondary students exhibited higher levels of multiple intelligence compared to their male counterparts. This finding is consistent with previous research, as indicated by the study conducted by Llera et al. (2019), which has also reported gender differences in intelligence profiles and learning styles. The observed gender differences in multiple intelligence levels indicate that there may be variations in how males and females engage with and excel in different intelligence dimensions. However, it is crucial to recognize that intelligence is a multifaceted construct influenced by various factors, including genetics, environment, and socialization processes.

Furthermore, the analysis did not find a significant influence of age and family type on multiple intelligence. These results suggest that age and family background may not be strong determinants of individual differences in intelligence profiles among secondary students in this study (Mantello et al., 2023). It is also consistent with the results of another study by Manhas (2019), where the relationship between socio-economic variables, including age and family type, and multiple intelligences of school students was examined. The lack of significant influence suggests that age and family type may not be significant predictors of variation in multiple intelligence scores.

The findings indicate that students from urban areas exhibited higher levels of multiple intelligence compared to students from rural areas. This observation aligns with previous studies that have reported differences in cognitive abilities and educational opportunities between urban and rural populations (Mantello et al., 2023). This finding is also supported by Vebrianto et al. (2020) which suggest that educational opportunities and resources available in urban areas may contribute to these disparities. It

highlights the potential impact of socio-cultural and environmental factors on the development of multiple intelligences. The socio-cultural and environmental factors associated with urban areas, such as access to diverse resources and educational institutions, may contribute to these disparities.

CONCLUSION

This study explored the levels of multiple intelligence among secondary school students, considering various demographic factors. The findings revealed that the majority of the participants exhibited average levels of intelligence across different dimensions, including linguistic, logical, spatial, naturalistic, interpersonal, and intrapersonal. These findings highlight the importance of recognizing the diverse nature of intelligence and the need to nurture different intelligence dimensions in educational settings. It is crucial to provide opportunities for students to develop their strengths and overcome potential challenges in various areas of intelligence. While this study contributes to our understanding of multiple intelligence in secondary school students, further research is needed to explore additional factors and their interactions that may influence intelligence profiles.

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