

Demographic Factors in Multiple Intelligence of Pre-Service Physical Science Teachers

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ABSTRACT

The present study aimed to investigate the differential effect of selected demographic factors on multiple intelligences of pre-service physical science teachers. The Multiple Intelligence Scale for Secondary School Teachers, developed by the investigators, was administered along with a personal data sheet on a sample of 482 pre-service physical science teachers, selected on a stratified random basis, from three districts of Tamil Nadu. The data, thus collected, were subjected to statistical analysis (t-test and One-way ANOVA) by keeping the objectives and hypotheses in mind. The study revealed a differential effect of gender on verbal-linguistic intelligence, logical-mathematical intelligence, bodily kinaesthetic intelligence, musical intelligence, and interpersonal intelligence. Significant differential effect of residential locale of the participants was observed on verbal-linguistic intelligence, musical intelligence, interpersonal intelligence, and naturalistic intelligence. While educational qualification was found to have significant differential effect on logical-mathematical intelligence, socio-economic status was found to have effect on interpersonal intelligence and moral-spiritual intelligence. The study further exposed the presence of significant difference among high-, average-, and low achievers in their verbal-linguistic intelligence, logical-mathematical intelligence, visual-spatial intelligence, interpersonal intelligence, and naturalistic intelligence.

Keywords: *Multiple Intelligences, Pre-Service Physical Science Teachers, Demographic Factors.*

The theory of multiple intelligences, proposed by Gardner, posits that individuals possess eight or more relatively autonomous intelligences. Peoples draw on these intelligences, individually and corporately, to create products and solve problems that are relevant to the societies in which they live (Gardner, 1983). His theory has got wide implications in any part of school and family, providing teaching methods more room for creativity, emphasizing comprehension and applying new knowledge, techniques and concepts to the teaching process (Paul & Arjunan, 2018; Abdulaziz, 2008). Teaching in the twenty-first century emphasizes diversity and recognizing that each student possesses his or her own set of unique

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Demographic Factors in Multiple Intelligence of Pre-Service Physical Science Teachers

strengths, needs, interests and learning styles. In today's classrooms, educators are expected to provide equitable opportunities for students to achieve their full potential in all aspects of development. Students come into the classroom as individuals with unique cultures, ethnicities, beliefs and attitudes (McFarlane, 2011). It is believed and assumed that educators embrace these differences by adapting their teaching practices to better meet the abilities, personalities and learning styles of their students (Levy, 2008). Through the implementation of differentiated instruction and teaching to students' multiple intelligences, teachers can effectively meet students' needs and promote student engagement, motivation and participation (Rao, 2016; Gable et al, 2000; Guild, 2001). Unfortunately, this assumption is generally not reflected in teachers' planning, teaching and evaluating (Levy, 2008). One of the major reasons behind this situation is that the existing teacher education programmed do not equip the prospective teachers to address the multiple intelligences of learners in the classroom. For this to happen the teacher educators should recognize the multiple intelligences of pre-service teachers and developing them professionally. Integrating multiple intelligences to pre-service teacher education is needed for enabling prospective teachers to identify the multiple intelligences of school students whom they will teach in future and optimise their learning outcomes (Shaikh et al. 2016). No much studies have conducted in India context to understand the multiple intelligences of pre-service teachers. The differential effect of demographic factors on the multiple intelligences of trainee teachers will provide valuable information needed to plan and implement MI based teacher education programmes. The present study is a modest attempt to explore the decisive role likely to be played by selected demographic factors on multiple intelligences of pre-service physical science teachers.

Objectives

The objective of the study is to find out the differential effect of gender, residential locale, educational qualification, socio-economic status, and academic achievement on multiple intelligences of pre-service physical science teachers.

Hypotheses

The following specific hypotheses were formulated for the purpose of the study:

1. There is no significant difference between male and female pre-service physical science teachers regarding different components of multiple intelligence.
2. There is no significant difference among pre-service physical science teachers from rural, semi-urban and urban areas regarding different components of multiple intelligence.
3. There is no significant difference between graduate and post-graduate pre-service physical science teachers regarding different components of multiple intelligence.
4. There is no significant difference among pre-service physical science teachers from high-, average-, and low socio-economic status with regard to different components of multiple intelligence.
5. There is no significant difference among high-, average-, and low achieving pre-service physical science teachers with regard to different components of multiple intelligence.

METHODOLOGY

Normative survey method was adopted for the present study. The study made use of a sample of 482 pre-service physical science teachers (male = 136, and female = 346), selected on the basis of '*stratified random sampling technique*' from Kanyakumari, Thirunelveli and Coimbatore districts of Tamil Nadu.

Demographic Factors in Multiple Intelligence of Pre-Service Physical Science Teachers

Tools used

Multiple Intelligence Scale for Secondary School Teachers (MIST): The multiple intelligences of the subjects were measured by using the Multiple Intelligence Scale for Secondary School Teachers developed by the investigators. It is a 100 item five-point Likert-type scale that measures 10 component abilities of multiple intelligence, viz., Verbal-linguistic intelligence, Logical-mathematical intelligence, Visual-spatial intelligence, Bodily-kinesthetic intelligence, Musical intelligence, Intrapersonal Intelligence, Interpersonal intelligence, Naturalistic intelligence, Existential intelligence, and Moral-spiritual intelligence. The scale is found to have a concurrent validity of 0.73 with another established test and test-retest reliability of 0.83.

Procedure

The tool was administered on the sample in small group situation under standardized conditions, their responses were collected in the response sheets, and the components wise scores on the MIST was found out. A personal data sheet was also attached with the SITT, so as to collect the required demographic information. The data thus obtained were subjected to appropriate statistical treatment with SPSS and interpreted accordingly.

ANALYSIS AND INTERPRETATION

Hypothesis-1: There is no significant difference between male and female pre-service physical science teachers regarding different components of multiple intelligence.

Table 1: Comparison of the Multiple Intelligences of Male and Female Teacher Trainees.

No.	MI Component	Groups	Statistical Indices			t-value	Level of Significance
			N	M	SD		
1	Verbal-linguistic intelligence	Male	136	35.06	5.58	5.206	.01 Level
		Female	346	32.31	5.08		
2	Logical-mathematical intelligence	Male	136	25.17	4.54	3.513	.01 Level
		Female	346	23.61	4.33		
3	Visual-spatial intelligence	Male	136	27.36	4.10	0.849	Not significant
		Female	346	27.03	3.66		
4	Bodily-kinesthetic intelligence	Male	136	25.24	4.09	3.116	.01 Level
		Female	346	24.06	3.56		
5	Musical intelligence	Male	136	28.95	4.40	2.122	.05 Level
		Female	346	29.83	3.96		
6	Intrapersonal intelligence	Male	136	20.58	3.30	1.072	Not significant
		Female	346	20.22	3.38		
7	Interpersonal intelligence	Male	136	28.06	4.26	4.737	.01 Level
		Female	346	26.12	3.95		
8	Naturalistic intelligence	Male	136	28.21	4.48	1.140	Not significant
		Female	346	28.69	4.12		
9	Existential intelligence	Male	136	18.22	2.86	1.648	Not significant
		Female	346	17.75	2.77		
10	Moral-spiritual intelligence	Male	136	25.40	5.47	1.490	Not significant
		Female	346	24.60	5.26		

Demographic Factors in Multiple Intelligence of Pre-Service Physical Science Teachers

The t-values obtained on comparing the male and female pre-service physical science teachers with respect to five component abilities of multiple intelligences are significant. These multiple intelligences components are: verbal-linguistic intelligence ($t = 5.206$; $p < 0.01$), logical-mathematical intelligence ($t = 3.531$; $p < 0.01$), bodily-kinesthetic intelligence ($t = 3.116$; $p < 0.01$), musical intelligence ($t = 2.112$; $p < 0.05$), and interpersonal intelligence ($t = 4.737$; $p < 0.01$). In all the above instances, except musical intelligence, the male teacher trainees excelled female teacher trainees. The female teacher trainees surpasses the male trainees in their musical intelligence. No significant difference were found between the male and female teacher trainees in the remaining multiple intelligences components, that is, visual-spatial intelligence ($t = 0.849$; $p > 0.05$), intrapersonal intelligence ($t = 1.072$; $p > 0.05$), naturalistic intelligence ($t = 1.140$; $p > 0.05$), existential intelligence ($t = 1.648$; $p > 0.05$), and moral-spiritual intelligence (MSI: $t = 1.490$; $p > 0.05$).

Hypothesis-2: There is no significant difference among pre-service physical science teachers from rural, semi-urban and urban areas regarding different components of multiple intelligence.

Table 2: Comparison of the Multiple Intelligences of Teacher Trainees from Rural, Semi-urban and Urban Areas (Summary of ANOVA)

No.	MI Components	Source	Sum of Squares	df	Mean Square Variance	F-value	Level of Significance
1	Verbal-linguistic intelligence	Between	557.359	2	278.680	10.051	.001
		Within	13281.321	479	27.727		
2	Logical-mathematical intelligence	Between	7.013	2	3.506	.177	Not significant
		Within	9463.792	479	19.757		
3	Visual-spatial intelligence	Between	2.001	2	1.000	.069	Not significant
		Within	6905.279	479	14.416		
4	Bodily-kinesthetic intelligence	Between	8.439	2	4.220	.299	Not significant
		Within	6750.664	479	14.093		
5	Musical intelligence	Between	551.510	2	275.755	17.504	.001
		Within	7545.994	479	15.754		
6	Intrapersonal intelligence	Between	.679	2	.339	.030	Not significant
		Within	5418.118	479	11.311		
7	Interpersonal intelligence	Between	282.249	2	141.125	8.532	.001
		Within	7922.639	479	16.540		
8	Naturalistic intelligence	Between	290.473	2	145.236	8.375	.001
		Within	8306.515	479	17.341		
9	Existential intelligence	Between	35.066	2	17.533	2.247	Not significant
		Within	3737.658	479	7.803		
10	Moral-spiritual intelligence	Between	2.558	2	1.279	.045	Not significant
		Within	13630.098	479	28.455		

Comparison of pre-service physical science teachers from rural, semi-urban and urban areas with regard to different components of multiple intelligences shows that significant difference exists among the groups in four out of ten component MI abilities. The multiple

Demographic Factors in Multiple Intelligence of Pre-Service Physical Science Teachers

intelligences components that differed significantly in line with the residential locale of the teacher trainees are: (i) Verbal-linguistic intelligence ($F = 10.051$; $p < .001$), (ii) Musical intelligence ($F = 17.504$; $p < .001$), (iii) Interpersonal intelligence ($F = 8.532$; $p < .001$), and (iv) Naturalistic intelligence ($F = 8.375$; $p < .001$). The locale based sub-samples of pre-service physical science teachers were found almost alike with regard to the remaining components of multiple intelligences.

Hypothesis-3: There is no significant difference between graduate and post-graduate pre-service physical science teachers regarding different components of multiple intelligence.

Table 3: Comparison of the Multiple Intelligences of Graduate and Postgraduate Teacher Trainees

No.	MI Component	Graduates (N = 247)		Postgraduates (N = 235)		t-value	Level of Significance
		M	SD	M	SD		
1	Verbal-linguistic intelligence	32.82	5.421	33.36	5.301	1.096	Not significant
2	Logical-mathematical intelligence	23.27	4.562	24.87	4.157	4.011	.01 Level
3	Visual-spatial intelligence	26.98	3.657	27.28	3.926	0.848	Not significant
4	Bodily-kinesthetic intelligence	24.46	3.893	24.33	3.598	0.380	Not significant
5	Musical intelligence	29.77	3.908	29.37	4.297	1.067	Not significant
6	Intrapersonal intelligence	20.05	3.420	20.60	3.271	1.812	Not significant
7	Interpersonal intelligence	26.49	4.110	26.85	4.152	0.949	Not significant
8	Naturalistic intelligence	28.52	4.174	28.60	4.292	0.201	Not significant
9	Existential intelligence	17.81	2.866	17.97	2.734	0.644	Not significant
10	Moral-spiritual intelligence	24.67	5.260	24.98	5.396	0.649	Not significant

The data and results of the comparison made between graduate and post-graduate students with regard to different components of multiple intelligences, given in Table 3, show that the groups are alike in nine out of ten components and differ only in one. Logical-Mathematical Intelligence is the only multiple intelligences component where a true difference was observed between graduate and postgraduate students ($t = 4.011$; $p < .01$). Scrutiny of the mean values estimated for the groups discloses that pre-service physical science teachers with postgraduate degree excel their counterparts with graduation in their logical-mathematical intelligence.

Demographic Factors in Multiple Intelligence of Pre-Service Physical Science Teachers

Hypothesis-4: There is no significant difference among pre-service physical science teachers from high-, average-, and low socio-economic status with regard to different components of multiple intelligence.

Table 4: Comparison of the Multiple Intelligences of Teacher Trainees from High-, Average-, and Low Socio-Economic Status (Summary of ANOVA)

No.	MI Components	Source	Sum of Squares	df	Mean Square Variance	F-value	Level of Significance
1	Verbal-linguistic intelligence	Between	25.158	2	12.579	.436	Not significant
		Within	13813.523	479	28.838		
2	Logical-mathematical intelligence	Between	3.861	2	1.931	.098	Not significant
		Within	9466.944	479	19.764		
3	Visual-spatial intelligence	Between	33.397	2	16.698	1.164	Not significant
		Within	6873.883	479	14.350		
4	Bodily-kinesthetic intelligence	Between	74.411	2	37.206	2.666	Not significant
		Within	6684.692	479	13.956		
5	Musical intelligence	Between	27.757	2	13.878	.824	Not significant
		Within	8069.747	479	16.847		
6	Intrapersonal intelligence	Between	16.784	2	8.392	.744	Not significant
		Within	5402.012	479	11.278		
7	Interpersonal intelligence	Between	337.991	2	168.995	10.290	.001
		Within	7866.897	479	16.424		
8	Naturalistic intelligence	Between	3.203	2	1.602	.089	Not significant
		Within	8593.784	479	17.941		
9	Existential intelligence	Between	5.152	2	2.576	.328	Not significant
		Within	3767.572	479	7.865		
10	Moral-spiritual intelligence	Between	724.490	2	362.245	13.442	.001
		Within	12908.165	479	26.948		

The results of the one way ANOVA carried out to compare the pre-service physical science teachers from high-, average-, and low socio-economic status (SES) with regard to the different components of multiple intelligences shows that the groups differ significantly in two out of ten components of multiple intelligences. The two multiple intelligences components which differ significantly across different levels of socio-economic status are Interpersonal Intelligence ($F = 10.290$; $p < .001$) and Moral-Spiritual Intelligence ($F = 13.442$; $p < .01$). Socio-economic status is not a significant factor in discriminating pre-service physical science teachers on the basis of the remaining eight multiple intelligences components. The Hypothesis-4 is, therefore, largely substantiated.

Hypothesis-5: There is no significant difference among high-, average-, and low achieving pre-service physical science teachers with regard to different components of multiple intelligence.

Demographic Factors in Multiple Intelligence of Pre-Service Physical Science Teachers

Table 5: Comparison of the Multiple Intelligences of High-, Average-, and Low Achieving Teacher Trainees (Summary of ANOVA)

No.	MI Components	Source	Sum of Squares	df	Mean Square Variance	F-value	Level of Significance
1	Verbal-linguistic intelligence	Between	569.299	2	284.649	10.275	.001
		Within	13269.382	479	27.702		
2	Logical-mathematical intelligence	Between	609.236	2	304.618	16.466	.001
		Within	8861.569	479	18.500		
3	Visual-spatial intelligence	Between	173.060	2	86.530	6.155	.01
		Within	6734.220	479	14.059		
4	Bodily-kinesthetic intelligence	Between	30.926	2	15.463	1.101	Not significant
		Within	6728.178	479	14.046		
5	Musical intelligence	Between	91.771	2	45.885	2.745	Not significant
		Within	8005.733	479	16.713		
6	Intrapersonal intelligence	Between	3.085	2	1.543	.136	Not significant
		Within	5415.712	479	11.306		
7	Interpersonal intelligence	Between	650.495	2	325.247	20.623	.001
		Within	7554.393	479	15.771		
8	Naturalistic intelligence	Between	220.575	2	110.287	6.307	.01
		Within	8376.413	479	17.487		
9	Existential intelligence	Between	7.101	2	3.551	.452	Not significant
		Within	3765.623	479	7.861		
10	Moral-spiritual intelligence	Between	36.344	2	18.172	.640	Not significant
		Within	13596.312	479	28.385		

The results of the one way ANOVA conducted to find out whether high-, average-, and low achievers differ significantly in different components of their multiple intelligences, given in Table 5, shows that the groups differ significantly in five out of ten multiple intelligences components. The multiple intelligences components where significant difference among high-, average-, and low achievers observed are Verbal-Linguistic Intelligence ($F = 10.275$; $p < .001$), Logical-Mathematical Intelligence ($F = 16.466$; $p < .001$), Visual-Spatial Intelligence ($F = 6.155$; $P < .01$), Interpersonal Intelligence ($F = 20.623$; $p < .001$), and Naturalistic Intelligence ($F = 6.307$; $p < .01$). No significant difference among pre-service physical science teachers at different levels of achievement were observed in other multiple intelligences components.

CONCLUSIONS

The present study revealed that gender is a significant factor in discriminating the pre-service physical science teachers on the basis of their verbal-linguistic intelligence, logical-mathematical intelligence, bodily kinaesthetic intelligence, musical intelligence, and interpersonal intelligence. Gender has no significant effect on the remaining five components of multiple intelligences. The Hypothesis-1 (*there is no significant difference between male and female pre-service physical science teachers regarding different components of multiple intelligence*) is, therefore, partially substantiated. While MI components such as verbal-

Demographic Factors in Multiple Intelligence of Pre-Service Physical Science Teachers

linguistic intelligence, musical intelligence, interpersonal intelligence, and naturalistic intelligence differ significantly among teacher trainees from rural, semi-urban and urban areas, residential locale was found to have no significant effect on the remaining six multiple intelligence components. The Hypothesis-2 (there is no significant difference among pre-service physical science teachers from rural, semi-urban and urban areas regarding different components of multiple intelligence) is, hence, partially justified. Only the logical-mathematical intelligence alone was found to be significantly affected by higher education received by the pre-service teachers. No significant difference was found exists between graduate trainees and postgraduate trainees with regard to the remaining nine MI abilities. The Hypothesis-3 formulated in this context (*there is no significant difference between graduate and post-graduate pre-service physical science teachers regarding different components of multiple intelligence*) is, therefore, mostly substantiated. Pre-service teachers from high-, average-, and low socio-economic status were found to differ significantly in interpersonal intelligence and moral-spiritual intelligence. SES was found have no significant effect on the remaining eight multiple intelligences. The Hypothesis-4 (*there is no significant difference among pre-service physical science teachers from high-, average-, and low socio-economic status with regard to different components of multiple intelligence*) is, therefore, largely substantiated. Half of the MI components considered in the study were found have significant effect on academic achievement as there exists significant difference among high-, average-, and low achieving teacher trainees. They are verbal-linguistic intelligence, logical-mathematical intelligence, visual-spatial intelligence, interpersonal intelligence, and naturalistic intelligence. The remaining five MI components are not decisive in academic achievement of pre-service physical science teachers. The Hypothesis-5 (there is no significant difference among high-, average-, and low achieving pre-service physical science teachers with regard to different components of multiple intelligence), is hence partially accepted.

REFERENCES

- Abdulaziz, A. (2008).institute of public administration Saudi Arabia. Dissertation Abstracts International: Section A, 69(5), 1688.
- Gable, R. A., Hendrickson, J. M., Tonelson, S. W., & Van Acker, R. (2000). Changing disciplinary and instructional practices in the middle school to address IDEA. *The Clearing House*, 73 (4), 205-208.
- Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: NY: Basic Books.
- Guild, P. B. (2001). Diversity, learning style and culture. *New horizons for learning*. Retrieved from: <http://education.jhu.edu/PD/newhorizons/strategies/topics/Learning%20Styles/diversity.html>.
- Levy, H. M. (2008). Meeting the needs of all students through differentiated instruction: Helping every child reach and exceed standards. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 81(4), 161-164.
- McFarlane, D. A. (2011). Multiple intelligences: The most effective platform for global 21st century educational and instructional methodologies. *College Quarterly*, 14 (2). Retrieved from: <http://search.proquest.com.myaccess.library.utoronto.ca/docview/1011395854?accounted=14771>
- Paul, T. M., & Arjunan, N. K. (2018). Interaction effect of multiple intelligence, emotional intelligence and social intelligence on professional effectiveness of teachers. *International Journal of Indian Psychology*, 6, (2), DIP: 18.01.044/20180602, DOI: 10.25215/0602.044

Demographic Factors in Multiple Intelligence of Pre-Service Physical Science Teachers

- Rao, V. (2016). Transforming learning – Empowering children through multiple intelligences. *International Journal of Indian Psychology*, 3 (4/74), ISSN:2348-5396 (e), ISSN:2349-3429 (p), DIP:18.01.029/20160304, ISBN:978-1-365-46362-4
- Shaikh, N., Shah, M., & Wakpainjan, P. (2016). A comparative study of multiple intelligences of students with respect to grades. *International Journal of Indian Psychology*, 3 (4/74), ISSN: 2348-5396 (e), ISSN: 2349-3429 (p), DIP:18.01.031/20160304, ISBN:978-1-365-46362-4

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Conflict of Interest

There is no conflict of interest.

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