

**EMOTIONAL INTELLIGENCE AND ATTITUDE TOWARDS
CONSTRUCTIVIST APPROACH OF TEACHING IN SCIENCE
EDUCATION: PERSPECTIVE OF SCHOOL TEACHERS**

Ujjwal Paul*

Dr. Abhijit Guha**

Abstract

Science teachers' emotional intelligence is an important motivational construct that shapes teacher effectiveness in the classroom. Teachers with a high level of emotional intelligence have been shown to be more resilient in their teaching and likely to try harder to help all students to reach their potential. Constructivism as a set of beliefs provides a model of cognition that leads directly to a method of teaching that, in turn, credits the student with the power to become an active learner. School science teachers' emotional intelligence put a positive impact on teachers' positive attitude towards constructivist approach in teaching. The present study was conducted to inquire the present status of West Bengal school science teachers' emotional intelligence in advocating Constructivist approach in their teaching strategy and its relation with teacher emotional intelligence. TEII and CASST scales were administered on 836 randomly selected school science teachers for measuring their emotional intelligence variability according to their categorical variations and its relation with attitude towards Constructivist approach in teaching. The major findings were observed that the majority of science teachers (both male & female) of West Bengal possess below average level of emotional intelligence in their daily classroom teaching situation. Schools location-wise & teaching training-wise the differences of teachers' emotional intelligence levels were significant and gender-wise the difference of teacher emotional intelligence was insignificant. Moreover, teachers' emotional intelligence and their attitudes towards Constructivist approach shared a moderately low positive correlation.

Keywords:

*Science Education;
Emotional Intelligence;
Constructivist Approach in
teaching;
science teachers*

Authors correspondence:

* Ph.D. Scholar, Swami Vivekananda Centre for Multidisciplinary Research in Educational Studies, Belur Math, Howrah. (Under University of Calcutta).

E-mail : ujjwalpaulss9@gmail.com

** Associate Professor, Ramakrishna Mission Sikshanamandira, Belur Math, Howrah, West Bengal. E-mail : abhi.guha68@gmail.com

1. Introduction

Humans have always been curious about the world around them. The inquiring and imaginative human mind has responded to the wonder and awe of nature in different ways. One kind of response from the earliest times has been to observe the physical and biological environment carefully, look for any meaningful patterns and relations, make and use new tools to interact with nature, and build conceptual models to understand the world. This human endeavor is science. Science is a dynamic, expanding body of knowledge covering ever new domains of experience. Broadly speaking, it involves several interconnected steps: observation, looking for regularities and patterns, making hypotheses, devising qualitative or mathematical models, deducing their consequences; verification or falsification of theories through observations and controlled experiments, and thus arriving at the principles, theories and laws governing the physical world. (National Curriculum Framework for Teacher Education-2009, NCFTE-Position paper national focus group on teaching of science, 2009). The teacher is the leader of inquiry in the science classroom. Teachers of science impart the delight and value of science to their students. They are facilitators and role models of the inquiry process in the classrooms (Pritchard, 2010). Emotional intelligence (EI) of teachers is a crucial factor to deliver their daily teaching-learning process in effective nature. Emotional intelligence covers a range of skills, including self-awareness, self-regulation, intra-personal & inter-personal relationship, motivation, empathy and social skills. Emotional intelligence is the “accurate appraisal and expression of emotions in oneself and others and the regulation of emotion in a way that enhances living, encompasses a set of interrelated skills and processes”. (Mayer, Di Paolo & Salovey, 1990, p. 772). According to Mangal (2008), there are four components of EI viz. intra-personal awareness, inter-personal awareness, own emotion, others emotion are the main factors in this study. It is the ability to regulate distressing affects like anxiety and anger and to inhibit emotional impulsivity. Academic articles exploring the concept of emotional intelligence began to appear in the early 1990s. Little was known about the concept in the general public or academia until it was popularized in 1995 by **Daniel Goleman’s** book, *Emotional Intelligence: Why it can matter more than IQ*. The book captured the attention of the general public, media, and researchers by claiming that emotional intelligence can be “as powerful, and at times more powerful, than IQ” in predicting how successful one is in life (Goleman, 1995, p. 34). Goleman (1998) asserts that emotional intelligence, not IQ, predicts workplace success and who transpires as a leader. In a study of Harvard graduates in the fields of law, medicine, teaching, and business, scores on entrance exams had zero or negative correlation with their eventual career success (Goleman, 1998). In this context Constructivist approach is a crucial strategy that can a science teacher may adopt in school to teach students for students’ endeavor towards science and building new ‘science concept’ in their schema. Constructivism concentrates on learning how to think and understand. This learning is transferable. Constructivist teachers must create opportunities for peer scaffolding and teacher directed scaffolding which is the process of allowing interaction that stimulates a learner to knowledge building, and therefore bridges differences of knowledge levels within a classroom. This situation gives students ownership what they learn, since, learning is based on students’ questions and explorations (Flynn, 2004). Emotional intelligence has a considerable impact on communication skills, which make success to create learner centered classroom by a teacher. So, an extent of relationship may be expected among the two variables i.e. emotional intelligence of science teachers and their attitude towards Constructivist Approach (ACA) in science teaching. Therefore, what are the levels of emotional intelligence in relation to gender, location of school, teaching training, teaching experience and what extent of relationship may be expected with science teachers’ attitude towards Constructivist Approach (ACA) in science teaching is the major concern for this study.

Some specific review on Science teachers' emotional intelligence showed that significant difference revealed between male & female teachers' emotional intelligence (Brackett & Katulak, 2006; Abdolvahabi et al., 2012). On the other hand, the study of Viney (1992) and Jeloudar et al.(2011) expressed that gender variation made no difference in the teachers' emotional intelligence, while age did. Updhyaya (2006) studied the personality of emotionally intelligent of teachers and found that as compared to low emotionally intelligent teachers, high emotionally intelligent teachers were more confident, persistent, supportive, enthusiastic and divergent and exists a positive correlation to their effective innovative teaching strategies.

1.1. Objectives of the study

Following major objectives were identified for the present study:

O₁. To study the status and level of secondary and higher secondary schools science teachers' emotional intelligence (EI) in teaching-learning process under gender variation.

O₂. To study and compare the School Science teachers' emotional intelligence (EI) under different categorical variables like gender, location of school, teaching training, teaching experience.

O₃. To identify the relationship between school science teachers' emotional intelligence and attitude towards Constructivist Approach in teaching at school level.

1.2. Hypotheses:

H₀1: There is no significant difference in mean score of emotional intelligence between male and female science teachers of schools.

H₀2: There is no significant difference in mean score of emotional intelligence between the science teachers of urban and rural schools.

H₀3: There is no significant difference in mean score of emotional intelligence between the trained and untrained science teachers of schools.

H₀4: There is no significant difference in mean score of emotional intelligence among the groups of science teachers' different level of teaching experiences (up to 5 years, 5+ to 10 years, more than 10+ years).

H₀5: There is no significant relationship between the scores of emotional intelligence and attitude towards Constructivist Approach of science teachers' teaching.

2. Research Method

The present study was done through descriptive survey study i.e. it was a quantitative study. Survey research design was employed under descriptive design.

2.1. Population of the study

The data was collected from the science teachers of Bengali Medium Secondary and Higher secondary School under academically controlled by West Bengal Board of Secondary Education (WBBSE) and West Bengal Council of Higher Secondary Education (WBCHSE) of West Bengal.

2.2. Sample structure & Sampling Technique

The sample (science teachers) was selected randomly from the different secondary and higher secondary schools from fifteen (15) districts of West Bengal under four socio- economic regions (according to Indian National Population Census, 2011) i.e. Hill Region, Doors Region, Ganges Delta and Rarh Region. The science teachers were selected from schools under urban (municipality) and rural (panchayat) areas. All the schools are aided by Government of West Bengal and academically controlled by WBBSE and WBCHSE. 836 Science teachers were selected as sample for this study. Stratified random sampling strategy was followed. The sample was randomness in nature. The sample structure is as follows:

Gender N=836		Location of School N=836		Teaching Training N=836		Teaching Experience N=836			TOT_ N
Male	Female	Urban	Rural	Trained	Untrained	0 to 5 Years	5+ to 10 Yrs	> 10+ Years	836
494	342	429	407	659	177	242	299	295	
59.1%	40.9%	51.3%	48.7%	78.8%	21.2%	28.9%	35.8%	35.3%	100%

2.3. Variables of the Study

In this study, the investigator was considered two types of variables. This two type of variable are given below-

Major Variables

- (i) Attitude towards constructivist approach as a dependent variable
- (ii) Teachers' emotional intelligence (EI) as independent variable

Categorical Variables

Gender (Male & Female), location of School (Urban & Rural), teaching training (Trained & Untrained status) and teaching experience (up to 5 years, 5+ to 10 years, 10+ years)

2.4. Tools of the study:

Present researchers had used two types of tools as follows:

Description of the Teacher's Emotional Intelligence Inventory (TEII)

Teacher's Emotional Intelligence Inventory (TEII) was constructed by Shubhra Mangal (2008) of National Psychology Corporation, Agra, India. It is a standardized scale contains 200 items having four factors Viz.1. 'Awareness of self and others', 2. 'Professional Orientation', 3. 'Intrapersonal Management' and 4. 'Interpersonal Management'. The reliability coefficient of the scale is 0.95 and has 5 point Likert type response category like 'Most of the times true of me', 'Quite often true of me', 'Sometimes true of me', 'Rarely true of me', 'Almost never true of me'. 5, '4', '3', '2', '1' were the respective scores awarded for the positive responses. Some items were negative in nature and the scoring was done in reverse order i.e. '1', '2', '3', '4', '5'.

Description of Constructivist Attitude Scale for School Teacher (CASST):

The Scale was consisted of 23 items developed by the investigators having 5 components viz. Enhancing Students' Autonomy', 'Exploration of Students' Learning', 'Creating Self-Learning Environment', 'Elaboration of Concept', 'Ensuring Classroom Democracy'. Content validity was judged by the expert rating of items by five experts. The inter-rating agreement model was used (Gregory, 2005) to see reliability of the raters. The coefficient of content validity was found 0.90. The reliability of the scale was computed by using Cronbach's alpha and was found 0.820. The scale has a good alpha value and it was acceptable. The categories of responses were 'strongly agree', 'agree', 'undecided', 'disagree', 'strongly disagree' and '5', '4', '3', '2', '1' were the respective scores awarded for the positive responses. Some items were negative in nature and the scoring was done in reverse order i.e. '1', '2', '3', '4', '5'.

2.5. Procedure of Data collection

For conducting the study, two scales were administered to 836 school science teachers from those schools chosen under study and asked to response according to their own belief and thought without any consultation with another teacher and to submit the responded scale by putting it into an envelope to maintain confidentiality.

2.6. Test of Normality of data

The normality of TEII, CASST were checked to the help of Large sample size of sample (N=836) (Pagano, 2013), Skewness, Kurtosis, Standard Error of means, and Standard Error of Skewness & Standard Error of kurtosis, normal distribution of Histogram, P-P & Q-Q plot and Box plot. Hence, data are normally distributed in both cases and there is an ample chance to test the hypotheses with parametric statistics.

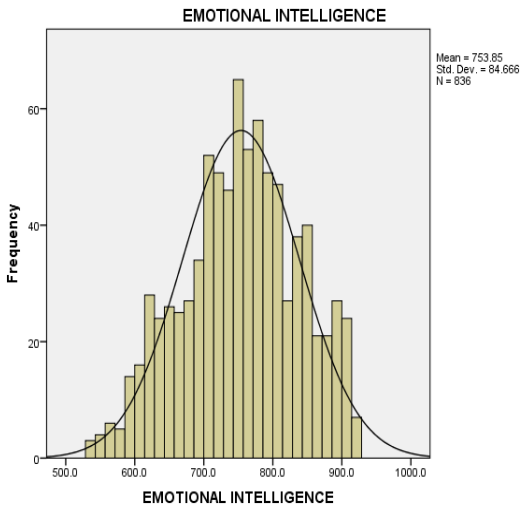


Figure: 1.1.(a).

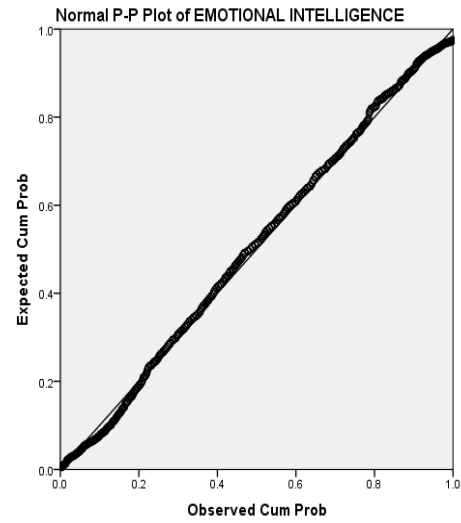


Figure: 1.1.(b).

Figure: 1.1.(a) & 1.1.(b) Data presentation _ Histogram & Normal P-P Plot_TEII

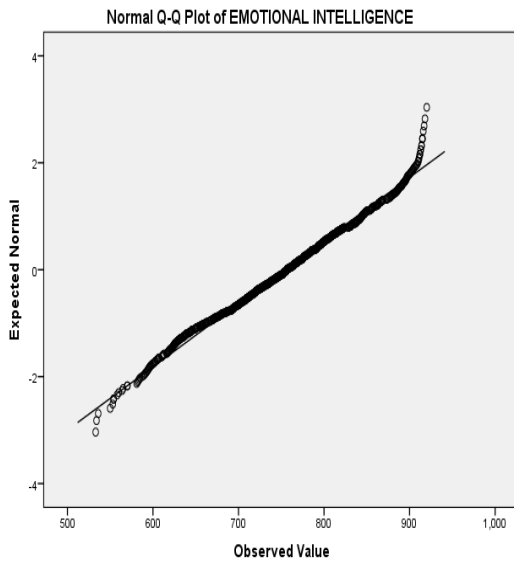


Figure: 1.1.(c).

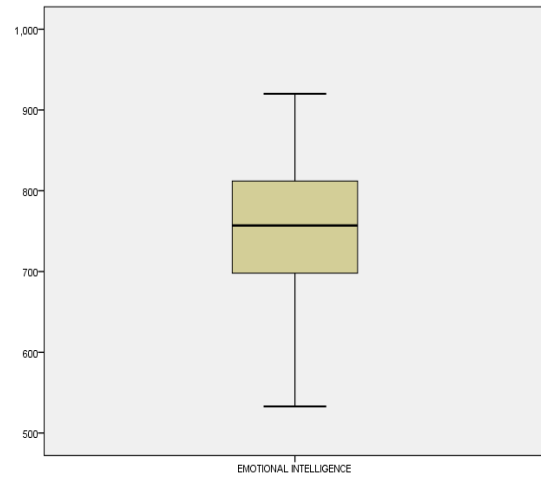


Figure: 1.1.(d).

Figure: 1.1.(c). & 1.1.(d).Data presentation _ Normal Q-Q Plot & Box Plot_TEII

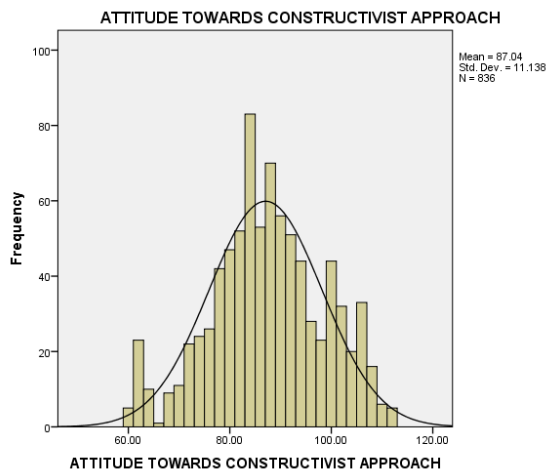


Figure: 1.2.(a).

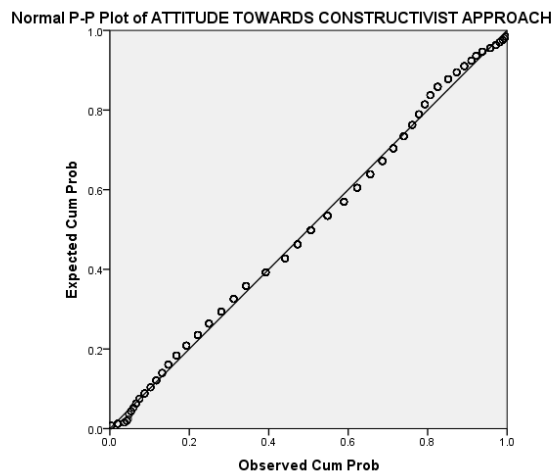


Figure: 1.2.(b).

Figure: 1.2.(a)& 1.2.(b). Data presentation _ Histogram & Normal P-P Plot_CASST

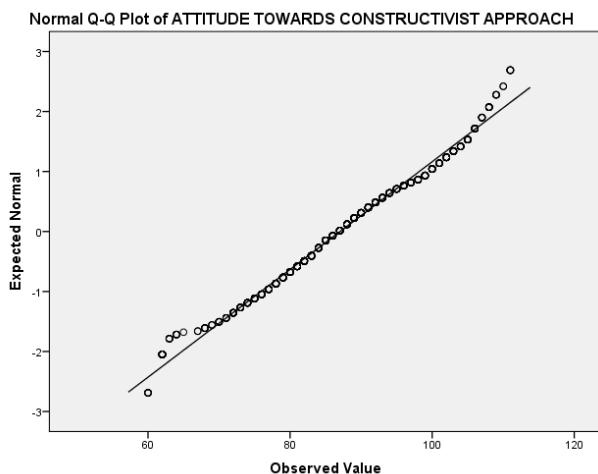


Figure: 1.2.(c).

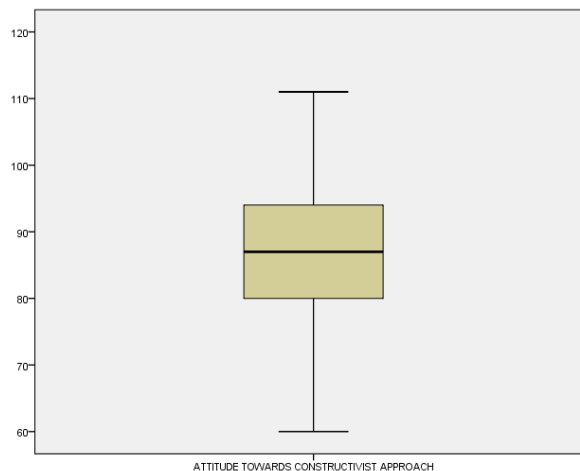


Figure: 1.2.(d).

Figure: 1.2.(c) & 1.2.(d).Data presentation _ Normal Q-Q Plot & Box Plot_CASS

3. Results and Analysis

3.1. Data Tabulation and Analysis

The responses of the sample were tabulated in Excel Worksheet, 2007. The Statistical Package for Social Sciences (SPSS version 22.0) was used for data analyses. Tables were used to summarize data. Descriptive Statistics such as Mean, Standard Deviation and parametric inferential statistics such as t-test, one-way ANOVA & correlation were used to analyze the data for testing the hypotheses.

		Frequency	Valid Percent	Cumulative Percent
TEII	Poor	57	11.5	11.5
	Below Average	316	64.0	75.5
	Average	76	15.4	90.9
	High	35	7.1	98.0
	Very High	10	2.0	100.0
	Total	494	100.0	

		Frequency	Valid Percent	Cumulative Percent
TEII	Poor	121	35.4	35.4
	Below Average	158	46.2	81.6
	Average	37	10.8	92.4
	High	18	5.3	97.7
	Very High	8	2.3	100.0
	Total	342	100.0	

(TEII= Teacher's Emotional Intelligence Inventory)

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Emotional Intelligence	Male	494	752.951	84.2311	3.7897
	Female	342	755.155	85.3982	4.6178

Sub- scale	Levene's Test for Equality of Variances			t- test for equality of means			
	Equal variances assumed	F	Sig.	t	df	Sig. (2 tailed)	Mean Difference
Emotional Intelligence		.230	.631	-.370 [#]	834	0.712	-2.2036

([#] Not significant at the 0.05 level)

	Location of School	N	Mean	Std. Deviation	Std. Error Mean
Emotional Intelligence	Urban	429	762.932	80.1973	3.8720
	Rural	407	744.283	88.2263	4.3732

Sub- scale	Levene's Test for Equality of Variances			t- test for equality of means			
Emotional Intelligence	Equal variances not assumed	F	Sig.	t	df	Sig. (2 tailed)	Mean Difference
		6.017	.014	3.193*	816.225	.001	18.6498

(*Significant at the 0.05 level)

	Training	N	Mean	Std. Deviation	Std. Error Mean
Emotional Intelligence	Trained	659	750.813	84.6084	3.2959
	Untrained	177	765.169	84.1576	6.3257

Sub- scale	Levene's Test for Equality of Variances			t- test for equality of means			
Emotional Intelligence	Equal variances assumed	F	Sig.	t	df	Sig. (2 tailed)	Mean Difference
		.004	.951	-2.006*	834	.045	-14.3561

(*Significant at the 0.05 level)

	N	Mean	Std. Deviation	Std. Error
0 To 5 Years	242	747.525	90.7827	5.8357
5+ Years to 10 Years	299	752.515	84.6675	4.8964
More Than 10+ Years	295	760.400	79.1175	4.6064
Total	836	753.853	84.6665	2.9283

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	22871.070	2	11435.535	1.598 [#]	.203
Within Groups	5962753.834	833	7158.168		
Total	5985624.903	835			

([#] Not significant at the 0.05 level)

		TEII	CASST
TEII	Pearson Correlation	1	0.280**
	Sig. (2-tailed)		.000
	N	836	836
CASST	Pearson Correlation	0.280**	1
	Sig. (2-tailed)	.000	
	N	836	836

(**Correlation is significant at the 0.01 level)

(CASST = Constructivist Attitude Scale for School Teacher, TEII= Teacher's Emotional Intelligence Inventory)

3.2. Major Findings and Interpretation

In the luminosity of the objectives, after completion of data analysis and interpretation, several points are viewed and the major findings and finding-based interpretation are as follows:

1. In the study of the status male science teachers' emotional intelligence (table no. 2) it has been found that 11.50% teachers are 'Poor' in emotional intelligence, 64% are 'Below Average', 15.40% are 'Average', 7.10% are 'High' in position. In case of female science teachers' emotional intelligence it reveals that (table no. 3) 35.40% teachers are 'Poor' in emotional intelligence, 46.20% are 'Below Average' in position while, 10.80% are in 'Average' range and 5.30% teachers are in 'High' emotional intelligence position.

2. For H_{01} , the results of the t-test depict in Table no. 4 show that the mean and SD of male science teachers are 752.951 and 84.23 respectively while the mean and SD of female science teachers are 755.155 and 85.39. Analyses of Levene's test for equality of variances (table no.5) shows that F value is 0.230 & corresponding p value is 0.631 ($p > .05$) so, homogeneous variances can be assumed. Table no. 5 also shows that in case of science teachers' emotional intelligence between male and female teachers the calculated $t_{(834)}$ value is 0.370 and 'p' value is 0.712 ($p > 0.05$). Hence, t is not significant at 0.05 level and H_{01} is not rejected. So, it can be interpreted that there is no significant difference in mean score of emotional intelligence between male and female science teachers of schools.

3. While estimating the mean and SD value of urban and rural science teachers in table no. 6 show that the mean and SD of urban science teachers are 762.932 and 80.19 respectively while the mean and SD of rural science teachers are 744.283 and 88.22. For H_{02} , the results of the t-test depict analyses of Levene's test for equality of variances (table no.7) the F value is 6.017 and the p value is 0.014 ($p < .05$) so, equal variances cannot be assumed. Due to the violations of the equal variance assumption, df is to be adjusted for unequal variances and in this case df of t is 816.225 (Warner; 2013, p. 208). Table no. 7 also shows that in case of emotional intelligence in variation of location of schools the calculated $t_{(816.225)}$ value is 3.193 and 'p' value is .001 ($p < 0.05$). Hence, t is significant at 0.05 level and H_{02} is rejected. So, it can be safely said that significant difference is exist in mean score of emotional intelligence between the science teachers of urban and rural schools.

4. For H_{03} , the results of the t-test (table no. 8) show that the mean and SD of trained science teachers are 750.813 and 84.60 respectively while the mean and SD of untrained science teachers are 765.169 and 84.15. Analyses of Levene's test for equality of variances (table no.9) shows that F value is 0.004 & corresponding p value is 0.951 ($p > .05$) so, homogeneous variances can be assumed. Table no. 9 also shows that calculated $t_{(834)}$ value is 2.006 and 'p' value is 0.045 ($p < 0.05$). Hence, t is significant, therefore, H_{03} is rejected. This means that there is a significant difference in mean score of emotional intelligence between the trained and untrained science teachers of schools.

5. For H_{04} , the results of the one-way ANOVA (Table no. 11) show that calculated $F_{(2,833)}$ value is 1.598 and p-value is 0.203 ($p > 0.05$). Hence, F-value is not significant, therefore H_{04} is not rejected. So, it can be interpreted that there is no significant difference in the mean scores of emotional intelligence among the estimated three

groups of science teachers in school in relation to their teaching experiences (up to 5 years, 5+ to 10 years & more than 10+ years).

6. While to find the relationship between science teachers' emotional intelligence & attitude towards Constructivist approach in teaching (for H_05) it has been found from analysis in table no. 12 that, correlation coefficient i.e. 'r' between score of TEII and CASST is 0.280 and p value is <0.01 which is significant at the 0.01 level as well as 0.05 level. Hence, H_05 is rejected. So, it can be interpreted that there exists a moderately low positive correlation between teachers' emotional intelligence & attitude towards Constructivist approach in teaching of science at school level.

3.3. Discussion

Present study shows that the majority of the science teachers' (both & female) emotional intelligence are in below average range and gender variation does not make any difference in construction of teachers' emotional intelligence which also supports the study of **Viney (1992)** and **Jeloudar et al.(2011)**, though female science teachers' emotional intelligence are insignificantly higher than the male science teachers' emotional intelligence. An interesting observation is held in school science teachers' emotional intelligence that is a significant difference in teachers' emotional intelligence between the urban and rural schools' teachers has been exist. Urban schools science teachers' emotional intelligence level are significantly higher than rural schools teachers' emotional intelligence. So, socio-economic background, cultural settings, and the life style of teachers in urban and rural areas may play a pivotal role in the use of balanced emotional intelligence among them. A significant difference is noticed in case of science teachers' emotional intelligence in relation to their teaching- training status that is untrained teachers' emotional intelligence is higher than the trained teachers' emotional intelligence. It is an optimistic picture that in course of time untrained teachers will be incorporated to the mainstream teaching force who will use their emotional intelligence and be able to manage our students as like as the trained teachers where the interaction between teacher and taught is concerned . It will also be true in case of establishing relationship between untrained and trained teachers in schools that no such problems will be created from untrained teachers for sustaining good relationship and interpersonal management. The study also reveals that there is a statistical significant moderately low positive correlation between science teachers' emotional intelligence and their attitude towards Constructivist approach in teaching which means that when high emotional intelligence level exists then it may confer that a positive attitude towards Constructivist approach in science teachers' teaching process may possess which support the findings of **Updhyaya (2006)**, which indicates that high emotionally intelligent teachers are more confident, persistent, supportive, enthusiastic and divergent and exist a positive correlation to their effective innovative teaching strategies. Present study also explores that the emotional intelligence level of more experienced science teachers (more than ten years in service) are moderately higher in the mean score than the other less experienced teachers' mean scores though, statistically it is insignificant.

4. Conclusion

The present study deems to hold some specific significance in modern education in general and in the field of teacher education. In an era of increasing accountability demands for teachers and students professional development will be the key to success in school reform initiatives as administrators struggle with improving the current teaching force. India is gearing up to become an international thespian in the Physical and Life sciences, and also other segment of sciences powered by its recent economic growth and a desire to add Biotechnology to its portfolio. Today's school learners' nourishment and lead them to make interested in science is very much essential for making them a future gladiator in field of innovative science. Science teachers' role in nurturing them is an important factor to give them the right pace and choice to grow up with their originality. The major findings of the study show that the majority of science teachers (both & female) of West Bengal possess below average level of emotional intelligence in their daily classroom teaching situation. Schools location-wise & teaching training status-wise the teachers' emotional intelligence level are found significantly different and gender-wise the difference of teachers' emotional intelligence is insignificant between its levels. Moreover, teachers' emotional intelligence and their attitudes towards Constructivist approach share a moderately low positive correlation.

As emotional intelligence and Constructivist approach in teaching is positively correlated, it is expected that teachers with a high level of emotional intelligence may be more resilient in their Constructivist approach in teaching and likely to try harder to help all students to reach their potential and it is a main factor for a teacher's greater understanding of the complexity of the teaching process. In west Bengal, Constructivist approach of entire education system specially in Science Education are yet to take firm position (attitude) for translating constructivist vision into practice (action) in real classroom situation. Hence, in conclusion it may be suggested that teachers, teacher educators and researchers are required to be engaged jointly and actively and put hands together for enhancing emotional intelligence and exploring modus operandi of practicing Constructivist approach in teaching, so that Constructivist approach can be made a real success in teaching-learning process for our future prosperous nation.

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