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AN ASSESSMENT OF THE TECHNOLOGY SUPPORTED LEARNING ENVIRONMENTS AND ATTITUDE TOWARDS TECHNOLOGY IN SELECTED NAAC ACCREDITED COLLEGES OF EDUCATION IN JAMMU

Jasdeep Kour and Adit Gupta

The study assessed students' perceptions of their technology-supported learning environments in teacher education classrooms in NAAC Accredited Colleges of Education in Jammu. The study is quantitative in nature and consisted of a sample of 150 students taken from two NAAC accredited colleges of education. The study utilizes the Technology Rich Outcome Focused Learning Environment Inventory (Aldridge and Fraser, 2003) modified by Gupta (2007). The results of the study reported that the modified TROFLEI was a reliable and valid instrument for assessing the learning environments in a technology-supported teacher education classroom. The assessment of the nature of the psycho-social learning environments revealed that students have a high mean score on all the scales of the TROFLEI and there are significant differences in the actual and preferred learning environments. Results showed that students usually want more teacher support, more cooperation and equity, more involvement and task orientation and more technology teaching than what they perceive is at present in a technology-supported learning environment. With regards to attitude towards technology, the students generally exhibited a positive attitude towards technology. Significant associations were also reported between the students' perceptions of their technology-supported learning environments and their attitudes toward technology. No significant gender differences were observed in the technology-supported learning environments.

KEYWORDS: NAAC, Teacher Education, TROFLEI

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INTRODUCTION

Technology has played a major role in improving the modern education system at various levels of teaching learning process whether it be school, college or university. Not only has the use of educational technology increased to make the process of teaching and learning in classroom more effective, learner centered and result oriented but it has also given an impetus to the teachers to use it as a tool to bridge the gap between traditional learning and modern educational requirements for the overall development of the learner. They also help management and make their work easy and faster. A look at the use of educational technology in different settings shows how rapidly various information and communication technologies are being adopted as a catalyst to enhance teaching and learning processes. Technology has become the enabler of education in the 21st century and has opened up new vistas in the field of educational research. With the advancement in technology and development of curriculum using Information and communication technology (ICT) rich material the teacher has more flexibility and autonomy to teach at his own pace and time in a highly interactive environment. (Gupta, 2007).

Technology means the systematic application of scientific or other organized knowledge to practical task. Therefore, educational technology is based on theoretical knowledge from different disciplines (communication, psychology, sociology, philosophy, artificial intelligence, computer science, etc.). Educational technology is the use of technology to improve education. It is a systematic, iterative process for designing instruction or training used to improve performance. Educational technology is sometimes also known as instructional technology or learning technology. (Wikipedia: Educational technology)

Educational technology helps in recording and presentation of costly experiments and can be reproduced at the time of need so as to make learning effective. The historical information, when it occurs can be recorded with the help of audio video cassette or documented in the form of a written or printed material. It has evolved new areas of institutional technology, teaching technology, training psychology and system approach in education, open learning and learning to be etc. educational technology helps in the preparations of an efficient and effective teacher ready for exercising his complex responsibilities by providing the topics and modules of student teaching- micro teaching, team teaching, simulated teaching, classroom interaction, teacher effectiveness, modification of teacher behaviour etc. educational technology contributes by providing continuous feedback and control to the process of evaluation. The feedback devices are used for

modification of the teacher behaviour. No doubt educational technology has facilitated the teaching learning process and has made the work of teacher simple and interesting. Educational technology has dramatically changed the lives of both teachers and students. (Narad, 2010).

FIELD OF LEARNING ENVIRONMENTS

The field of learning environment research has been influenced by the work of several influential researchers. Lewin's (1936) seminal work introduced the concept that personal behaviour is a result of the interactions between the individual and his/her environment. Murray (1938) followed Lewin's approach by proposing a needs-press model which allows the analogous representation of person and environment in common terms. Personal needs refer to motivational personality characteristics representing tendencies to move in the direction of certain goals, in contrast to environmental press which provides an external situational counterpart which supports or frustrates the expression on internalized personality needs (Fraser, 1998a). Murray's needs press theory was later expanded by Stern, Stein, and Bloom (1956), who concluded that differences also exist between an individual's perceptions, a group's perceptions, and the perceptions of an external observer of a single environment (Wolf & Fraser, 2005).

Researchers have carried out many dozens of studies of the relationship between student achievement and the quality of the classroom learning environment (Fraser, 1998a). These have been carried out in numerous different countries with tens of thousands of students. The consistent and overwhelming evidence from these studies is that the classroom environments strongly influences student how comes. Therefore, teachers should not feel it is waste of time for them to devote time and energy to improving their classroom environments. The research shows that attention to the classroom environment is likely to pay off in terms of improving student outcomes. Learning environments research has become firmly established, especially in science education (Fraser, 1986,1994; Fraser & Walberg 1991). Research and evaluation in science education have relied heavily on the assessment of academic achievement and other valued learning outcomes. However, these measures cannot give a complete picture of the educational process. Because students spend up to15,000 hours at school by the time they finish senior high school (Rutter, Maugham, Mortimer, Ouston, & Smith 1979), students have a larger stake in what happens to them at school and their reactions to and perceptions of their school experiences are significant. Remarkable progress has been made in conceptualizing, assessing and investigating the determinants and effects of social and psychological aspects of the learning

environments of classrooms and schools.

According to Fraser (2002,) there are six areas of research which apply classroom environment assessments and these are "(1) relationship between student outcomes and classroom environment, (2) evaluation of educational performance, (3) differences between students' and teachers' perceptions of the same classrooms, (4) determinants of classroom environment, (5) use qualitative research methods, and (6) cross-national studies". Most learning environment questionnaires provide information on the measure of students' learning outcomes, students' perceptions of their learning environment. Learning environments instruments essentially "measure the meaningful environments for students to a given classroom" (Anderson, Hamilton, & Hatte, 2004,). Moreover, there are many instruments to assess learning environments. Some of those instruments are Learning Environment Inventory (LEI), Classroom Environment Scale (CES), Individualized Classroom Environment Questionnaire (ICEQ), My Class Inventory (MCI), College University Classroom Environment Inventory (CUCEI), Questionnaire on Teacher Interaction (QTI), Science Laboratory Environment Inventory (SLEI), Constructivist Learning Environment Survey (CLES), Technology-Rich Outcomes-Focused Learning Environment, Inventory (TROFLEI), What Is Happening In this Class? (WIHIC), Students' Perception of Assessment Questionnaire (SPAQ), and Cultural Learning Environment Questionnaire (CLEQ).

The development of the Technology-Rich Outcomes-Focused Learning Environment Inventory (TROFLEI) by Aldridge, Fraser, et al. (2003) drew on the What is Happening in this Class (WIHIC) questionnaire. The development and validation of this instrument was considered important as it was seen as a "widely-applicable and distinctive questionnaire for assessing students' perceptions of their actual and preferred classroom learning environments in outcomes-focused, technology-rich classroom learning settings" (Aldridge, Fraser, et al., 2003, p. 175). The TROFLEI measures 10 dimensions of the actual and preferred classroom environments at high school level: student cohesiveness, teacher support, involvement, investigation, task-orientation, cooperation, equity, differentiation, computer usage and young adult ethos (Aldridge, Fraser, et al., 2003). Aldridge, Fraser, et al.'s (2003) work, which involved Grade 11 and 12 students at an innovative new school, found TROFLEI to be a reliable and valid questionnaire for monitoring outcomes-focused and ICT-rich classroom learning environments and student attitudes. Aldridge and Fraser (2003) confirmed that not only was TROFLEI valid and reliable at the senior high school level, but also across a number of different subjects and learning areas.

Students' attitudes were also investigated in Aldridge, Fraser, et al.'s (2003) study with the development of an attitude instrument. This new instrument used three scales to assess the affective outcomes of technology-rich outcomes-focused learning environments. These scales were: Attitude to Subject; Attitude to Computer Usage; and Student Academic Efficacy. Attitude to Subject was based on a scale from the Test of Science-Related Attitudes (TOSRA) (Fraser, 1981a). The scale, Attitude to Computers, was modified from the Computer Attitude Scale (CAS) (Newhouse,2001) and the third scale of Student Self Efficacy was based on a scale from the Morgan-Jinks Student Efficacy Scale (MJSES) developed by Jinks and Morgan(1999). Aldridge and Fraser (2003) reported that "satisfactory factorial validity, internal consistency reliability and discriminant validity were found for the new attitude instrument for both the individual and class mean as the units of analysis".

This study has given a chance to the authors to investigate students' perceptions of technology-supported teacher education classroom learning environments in selected NAAC accredited colleges of education of Jammu city. As a part of this study gender differences would also be investigated in students' perceptions of their teacher education classroom learning environment and their attitude towards technology.

RESEARCH STUDIES INVOLVING TROFLEI IN INDIA

Kour, (2010) described the teaching of science at the secondary level can be made more effective with the judicious utilization of a multi-media approach involving modern information and communication technologies that is entering the educational system in general and the schools in Jammu region (J&K), in particular, surely but slowly. A major impact of technology today in the field of education is that at all level classrooms are becoming technology rich learning environments of technology supported classroom. The present study utilized the Technology Rich-Learning Environment Inventory (TROFLEI), to study the perception of students' actual and preferred classroom learning environment in a technology supported science classroom at the secondary level in selected J&K State Board and CBSE schools of Jammu city. A sample of 250 students studying science through technology classrooms were selected for the study. The result of the study reported that the TROFLEI was a reliable and valid instrument for assessing the learning environments in a technology supported science classroom. Significant association were also reported between the students' perception of their technology supported learning environments and their attitude towards science academic efficacy. Significant gender differences in technology supported learning environment have also been reported in the study.

Gupta and Fisher (2012) reported the adoption of technology has created a major impact in the field of education at all levels. Technology-supported classroom learning environments, involving modern information and communication technologies, are also entering the Indian educational system in general and the schools in Jammu region (Jammu & Kashmir state, India) in particular. This study, which was the first of its kind in India, reports the use of a modified form of Technology-Rich Outcomes-Focused Learning Environment Inventory (TROFLEI) for assessing students. Analysis of data from 705 students from 15 classes provided evidences for the questionnaire in Indian Science Classroom setting. The same data also were used for studying gender differences and associations between student's perceptions of their technology supported learning environments and learning outcomes (attitudes towards science, academic efficacy and academic achievement). Significant gender differences in technology-supported learning environments have also reported in this study. This research study happens to be the first of its kind in this region and should provide a thrust towards the use of technology-supported classroom for effectively teaching other school subjects.

Kour, (2013) described that the present study attempts to assess the learning environments of technology supported mathematics classrooms in selected private schools of Jammu city at the secondary stage. The study utilizes the Technology Rich Outcomes Focused Learning Environment Inventory actual and Preferred versions of the Technology-Rich Outcomes-Focused Learning Environment Inventory (TROFLEI), developed by Gupta (2007) which has nine scales: student cohesiveness, teacher support, involvement, investigation, task orientation, cooperation, equity, differentiation and technology teaching. Sample will be collected from 250 students studying mathematics at secondary stage (9th & 10th classes) in five private co-educational schools within the age group of 14 to 16 years. The results of the study reported that the TROFLEI was a reliable and valid instrument for assessing the learning environments in a technology rich mathematics classroom. The results showed that students usually want more of technology supported mathematics teaching in their classroom i.e. students prefer Mathematics classrooms in collaboration with technology with as they find learning mathematics through the use of technology interesting, lively &informative. Significant associations were also reported between the students' perceptions of their technology rich learning environments and their attitude towards mathematics and academic efficacy. No significant gender differences in technology-rich learning environments have also been reported in the study.

Prabha, (2013) described that the present study seeks to compare the technology rich classrooms learning environments at the middle level in selected Central Board of Secondary Education (CBSE) and Jammu and Kashmir state Board of School Education (J&K State Board) affiliated schools of Jammu city. The study utilizes the technology Rich Outcomes Focused Learning Environment Inventory (Gupta and Fisher, 2008), to study the perception of the students' in actual and preferred classroom learning environments in a technology rich science classroom. A sample of 250 students studying science through technology in classroom was selected for the study from five schools of Jammu city i.e. two schools from CBSC and three schools from J&K State Board. The results of the study reported that the TROFLEI was a reliable and valid instrument for assessing the learning environments in a technology rich science classroom. The result also show that students' of both CBSC and J&K Stat Board would prefer enriched technology rich learning environments than the one they presently perceive. The students exhibit positive attitudes towards science when taught in technology rich learning environments. Significantly associations were also reported between the students' perceptions of their technology rich learning environments and their attitudes towards science. No significant gender differences in students' perceptions of their technology-rich science classroom learning environments and attitudes towards science have been observed in this study. The results of the comparison of the technology rich science classroom learning environments between selected CBSE and J&K State Board affiliated schools show that one of the nine scales of TROFLEI i.e. Technology Teaching significant differences have been observed in favour of CBSE schools.

In a study conducted by Kumari, Goswami and Gupta (2015) the students' perceptions of the learning environments of technology supported teacher education classrooms in relation to three variables, i.e., previous qualification, gender and teaching subjects. The tool used for the study was the modified form of Technology–Rich Outcomes-Focused Learning Environment Inventory (TROFLEI). Analysis of data of 317 teacher trainees from the College of Education provides evidence for the reliability and validity of the Questionnaire. The same data was taken for the studying the gender differences and teaching subjects. The results suggested that positive associations existed in students' perceptions in their technology supported learning environments. Gender differences and teaching subjects also suggested that there is some differences in technology-supported learning environments were also reported on modified TROFLEI.

Objectives Of The Study

The main objectives of this study were:

1. To assess the learning environments in a technology supported teacher education classroom.
2. To compare the actual and preferred learning environments in a technology supported teacher education classroom.
3. To investigate associations between attitude towards technology and technology supported learning environments in teacher education classroom.
4. To investigate whether gender differences exist in technology supported learning environments in teacher education classroom and their attitude towards technology.

Research Methodology

Sample

Purposive sampling technique was used to collect the sample for the study. The sample covered students studying in two NAAC accredited colleges of education of Jammu city. The sample was chosen carefully so as to be the representative of the population and comprised of co-educational classes in order to permit an unbiased test of gender differences. For this study, the data was collected from 150 students of two NAAC accredited colleges of education. In the present sample of 150 students, there were 39 male students and 111 female students who studied through technology supported teacher education classrooms.

Tools Used in the Study

The Technology–Rich Outcomes-Focused Learning Environment Inventory (TROFLEI) was used in the study to assess the learning environments in a technology supported teacher education classroom. For the purpose of this study a modified form of TROFLEI was used which was developed by Gupta (2007). This research showed that TROFLEI was a reliable and valid tool that can be used in Indian school settings. Apart from the TROFLEI questionnaire one additional scale regarding the attitude towards science was also used for the study. The modified TROFLEI consisted of nine learning environment scales having 72 items (eight in each scale) and one additional scale of Attitude towards Science. The Attitude towards Science scale measures the extent to which students are interested in, enjoy and look forward to lessons in

Mathematics. The modified form of TROFLEI used for this study is given in Table 1 and Table 2.

Table 1

Description for Each Scale and Example of Items in the Technology-Rich Outcomes-Focused Learning Environment Inventory (TROFLEI) Questionnaire.

No.	Scale Name	Scale Description	Item
1.	Student Cohesiveness (SC)	The extent to which student know, help and are supportive of one another.	I make friendships among students in this class.
2.	Teacher Support (TS)	The extent, to which the teacher helps, befriends trusts and is interested in students.	The teacher takes a personal interest in me.
3.	Involvement (IV)	The extents, to which students have attentive interest, participate in discussions, do additional work and enjoy the class.	I discuss ideas in class.
4.	Investigation (IN)	The extent to which skills and processes of enquiry and their use in problem solving and investigation are emphasised.	I know the goals for this class.
5.	Task Orientation (TO)	The extent to which it is important to complete activities planned and stays on the subject matter.	I carry out investigations to test my ideas.
6.	Cooperation (CO)	The extent to which students cooperate rather than compete with one another on learning tasks.	I cooperate with other students when doing assignment work.
7	Equity (EQ)	The extent to which students are treated equally by the teacher.	I am treated the same as other students in this class.
8	Differentiation (DI)	The extent to which teachers cater for students differently on the basis of ability, rate of learning and interests.	I work at my own speed.
9	Technology Teaching (TT)	The extent to which students find learning through technology interesting, lively and informative.	I look forward to learning through technology supported classroom.

Table 2
Description of Attitude Towards Technology Scale.

Scale	Scale Description	Items
Attitude Towards Technology	The extent to which students are interested in, enjoy and look forward to lessons by technology.	I enjoy lessons through technology classroom.

FINDINGS AND RESULTS

Validation of the TROFLEI

The data for the modified TROFLEI were collected from a sample of 150 students in two colleges of Education who studied in a technology-supported teacher education classroom and were analysed for determining the reliability and validity of the TROFLEI questionnaire. Two indices for scale reliability and validity were generated for both the Actual and Preferred Forms separately. The Cronbach alpha reliability coefficient is used as an index of scale internal consistency indicating the consistency of the test items relative to other test items which were designed to measure the same construct of interest. A coefficient of 0.00 indicates a complete absence of a relationship, whereas 1.00 is the maximum possible coefficient that can be obtained (Fraenkel & Wallen, 2000). A discriminant validity index (namely, the mean correlation of a scale with other scales) was used as evidence that shows that each TROFLEI scale measures a separate dimension that is distinct from the other scales in this questionnaire.

Table 3 illustrates the results of the statistical indices. The reliability scale estimates for the different scales of the TROFLEI using the individual student as the unit of analysis ranged from 0.73 for the Involvement scale to 0.88 for the Technology Teaching scale in the Actual Form of TROFLEI and from 0.83 for the Task Orientation scale to 0.88 for the Student Cohesiveness scale in the Preferred Form. These indices of reliability were comparable to those in past studies that have used the TROFLEI (Gupta & Fisher, 2012). The reliability results of the TROFLEI were consistently above 0.50. This suggests that the TROFLEI can be considered a reliable tool (De Vellis, 1991) for use in Teacher Education classrooms. The inter scale correlations were used to compute the mean correlation of one scale with other scale thereby determining the discriminant validity of the TROFLEI questionnaire. Using individual as the unit of analysis, the discriminant validity result (mean correlation of a scale with other scales) for the nine scales of the TROFLEI ranged from 0.21 for Teacher Support to 0.51 for Equity scale in the Actual From and from 0.32 for Investigation scale to 0.54 for the Equity scale in the Preferred form (Table 4.3). The modified TROFLEI was thus a valid instrument for use in Teacher Education classroom. The graphical representation of Cronbach Alpha

Reliability scores of the Actual and Preferred Forms of TROFLEI were shown in the Figure 1.

Table 3
Internal Consistency Reliability (Cronbach Alpha Coefficient), Discriminant Validity (Mean Correlation with Other Scales).

Scale Name	No. of Items	Alpha Reliability		Mean Correlation with Other Scales	
		Act.	Pref.	Act.	Pref.
Student Cohesiveness (SC)	8	0.80	0.88	0.43	0.47
Teacher Support (TS)	8	0.82	0.86	0.21	0.40
Involvement (IN)	8	0.73	0.85	0.36	0.43
Task Orientation (TO)	8	0.81	0.83	0.45	0.47
Investigation (IV)	8	0.82	0.87	0.47	0.32
Cooperation (CO)	8	0.86	0.87	0.41	0.50
Equity (EQ)	8	0.85	0.84	0.51	0.54
Differentiation (DI)	8	0.80	0.85	0.45	0.49
Technology Teaching (TT)	8	0.88	0.87	0.41	0.48

Act. Means Actual and Pref. means Preferred

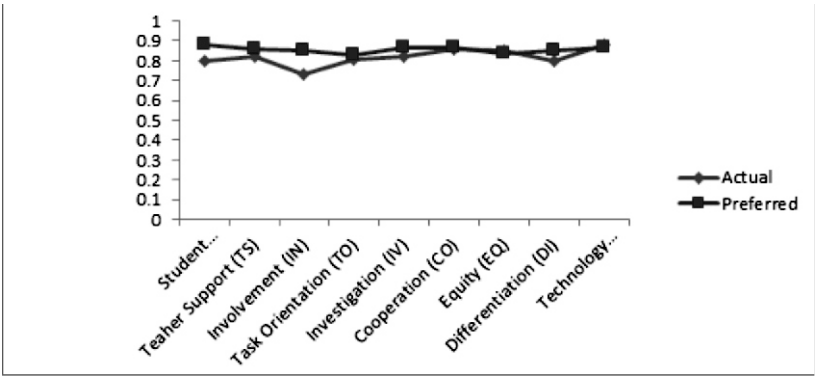

Figure 1. Cronbach Alpha Reliability of the Actual and Preferred Forms of the TROFLEI.

Validation of the Attitude Scale.

To measure students' attitude Towards Technology data were collected on one scale, namely, the Attitude Towards Technology scale. There were eight items

in the scale. The data on this scale was collected from a sample of 150 students in two colleges of Education. The internal consistency reliability (Cronbach alpha coefficient) for the scale was computed with the individual as the unit of analysis. The results are shown in Table 4.

Table 4
Internal Consistency Reliability (Cronbach Alpha Coefficient) for the Attitude Towards Technology.

Scale Name	No. of Items	Alpha Reliability
Attitude Towards Technology	8	0.58

The scale reliability for the Attitude Towards Technology scale was 0.58. The reliability result of the scale was above 0.50. This suggested that this scale could be used as reliable tool (De Vellis, 1991) in teacher education classroom settings to study the attitude of students towards technology.

Means and Standard Deviations on the TROFLEI

The data on the nine scales of the TROFLEI were collected from 150 students in two NAAC Accredited colleges of Education who have been studying through a technology-supported classroom setup. Item means and standard deviations were computed to determine the nature of the technology-supported teacher education classroom learning environments using the TROFLEI. The data obtained is presented in Table 5.

In Table 5, it can be seen that the mean scores of the different scales of the TROFLEI ranged from 3.34 for the Teacher Support scale to 3.86 for the Student Cohesiveness scale in the Actual Form. This shows that students were generally able to perceive technology-supported learning environments as beneficial for them and technology was being used quite often in the day-to-day teaching in teacher education colleges. An examination of the mean scores for the Preferred Form of the TROFLEI as given in Table 5 shows that the mean scores ranged from 3.52 for the Investigation scale to 3.95 for the Cooperation scale. This indicates that students usually want more technology usage in the classroom in their colleges and though the existing technology-supported learning environments were positive, the average item mean for student's scores on the Preferred Form shows that the students would prefer enriched technology supported learning environments than the one they presently perceive. The values of the standard deviations in both the Actual and Preferred Forms of the TROFLEI were less than 1, which shows that there

were no major deviations in students' perceptions of the technology-supported learning environments in their teacher education classrooms.

Table 5

Mean and Standard Deviations (SD) for the Modified Technology-Rich Outcome-Focused Learning Environment Inventory (TROFLEI).

Scale Name	No. of Items	Mean		Standard Deviation(SD)	
		Act.	Pref.	Act.	Pref.
Student Cohesiveness	8	.86	3.94	0.66	0.67
Teacher Support	8	3.34	3.62	0.74	0.81
Involvement	8	3.39	3.71	0.59	0.70
Task Orientation	8	3.66	3.89	0.73	0.69
Investigation	8	3.52	3.52	0.70	0.70
Cooperation	8	3.78	3.95	0.76	0.74
Equity	8	3.59	3.91	0.73	0.69
Differentiation	8	3.49	3.85	0.70	0.73
Technology Teaching	8	3.46	3.85	0.81	0.76

n=150

Means and Standard Deviations on the Attitude Scale.

From the data presented in Table 6 for the attitude towards technology scale, the value of the mean for the Attitude Towards Technology scale was 3.41. The value for the standard deviation for the attitude towards technology was 0.62 which depicts that generally students exhibit a positive attitude towards technology when taught in technology-supported teacher education classrooms. Results show that the students were more interested in learning and studying various subjects through technology.

Table 6
Mean and Standard Deviation for the Attitude Towards Technology Scale.

Scale Name	Mean	Standard Deviation
Attitude Towards Technology	3.41	0.62

Comparison of the Actual and Preferred Technology-Supported Classroom Learning Environments

To compare the technology-supported learning environments in selected colleges of education, the t-test was administered to find if significant differences exists. Table 7 shows the comparison of technology-supported learning environments between the Actual and Preferred forms.

Table 7

Means, Standard Deviations and Significance of Difference between Means for Actual and Preferred form of the Modified TROFLEI.

Scale	Types of Scale	Mean	Mean Difference (M-F)	Standard Deviation	*t*
Student Cohesiveness	Actual	3.86	-0.08	0.66	1.55
	Preferred	3.94		0.67	
Teacher Support	Actual	3.34	-0.28	0.74	5.25**
	Preferred	3.36		0.81	
Involvement	Actual	3.39	-0.32	0.59	5.91**
	Preferred	3.37		0.70	
Task Orientation	Actual	3.66	-0.23	0.73	4.13**
	Preferred	3.89		0.69	
Investigation	Actual	3.52	0.00	0.70	0.00
	Preferred	3.52		0.70	
Cooperation	Actual	3.78	-0.17	0.76	2.60**
	Preferred	3.95		0.74	
Equity	Actual	3.59	-0.32	0.73	6.05**
	Preferred	3.91		0.69	
Differentiation	Actual	3.49	-0.32	0.70	6.53**
	Preferred	3.85		0.73	
Technology Teaching	Actual	3.46	-0.39	0.81	5.60**
	Preferred	3.85		0.76	

*** Significant at p<0.01, n = 150*

The results of the comparison of the technology-supported learning environments in the actual and preferred form were presented in Table 7. Out of 9 scales seven scales of TROFLEI only were significant at p<0.01 levels i.e. Teacher Support, Involvement, Task Orientation, Cooperation, Equity, Differentiation and Technology Teaching Scales. It shows that the students preferably want more teacher support, more involvement, more task orientation, more cooperation, more equity, more differentiation and more technology teaching in Technology-Supported teacher education classroom. Figure 2 represents the graphical representation of mean scores in the actual and preferred form on the nine scales of the TROFLEI.

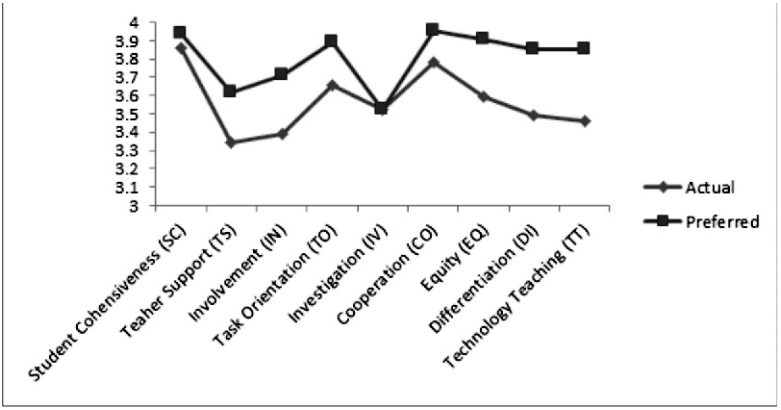

Figure 2. Graphical representation of mean scores in the actual and preferred form on the nine scales of the TROFLEI.

Associations with the TROFLEI

Associations Between Attitude Towards Technology and Actual Form of the Modified TROFLEI.

Students' perceptions of their technology-supported learning environments and its association with the attitude towards technology were explored using simple and multiple correlation analysis, followed by computation of the regression coefficient. The results of these analyses were shown in Table 8 for Actual Form of the TROFLEI, which gives a clear picture indicating significant associations between technology-supported learning environments and Attitude Towards Technology.

The results from Table 8 indicate that for simple correlation (r) for eight scales out of nine scales of TROFLEI i.e. Student Cohesiveness, Involvement, Task Orientation, Cooperation, Equity, Differentiation and Technology Teaching Scales were statistically significant and positively associated with student attitudes towards technology ($p<0.001$, $p<0.01$, $p<0.05$) at the individual level of analysis. The value of multiple correlation (R) between students' perceptions as measured by the different scales of the TROFLEI and the Attitude Towards Technology scale was 0.50 which was statistically significant. The R^2 value indicates that 25 percent of the variance in the students' attitude towards Technology can be attributed to the students' perceptions of technology-supported learning environment. To provide information about the unique contribution of each learning environment scale to the Attitude towards Technology scale, Standardized Regression values were calculated. Regression coefficient values (β) indicates that one of the nine TROFLEI scales i.e. Technology Teaching (0.42) uniquely accounts for significant ($p<0.001$) amount of variance in students' attitude towards

technology. This means the Technology Teaching was an independent predictor of individual students' attitude towards technology usage in teacher education classrooms in the selected NAAC accredited colleges of education.

Table 8

Associations between the TROFLEI Scales and Attitude Towards Technology in terms of Simple Correlation (r), Multiple Correlation (R) and Standardised Regression Coefficient (β) in the Actual Form.

Scale Name	Attitude Towards Technology	
	r	*β*
Student Cohesiveness	0.34**	0.16
Teacher Support	0.09	- 0.04
Involvement	0.17*	-0.05
Task Orientation	0.29***	-0.06
Investigation	0.31**	0.14
Cooperation	0.24**	0.04
Equity	0.33**	0.06
Differentiation	0.28**	-0.13
Technology Teaching	0.44**	0.42***
Multiple Correlation	$R = 0.50^{***}$	
	$R^2 = 0.25$	

****Significant at p<0.001, ** Significant at p<0.01, * Significant at p<0.05*

Associations Between Attitude Towards Technology and Preferred Form of the Modified TROFLEI.

Students' perceptions of their Preferred technology-supported learning environments and its association with their attitude towards technology was explored using simple and multiple correlation analysis, followed by computation of the regression coefficient. The results of these analyses were shown in Table 9 for the Preferred Form of the TROFLEI, which gives a clear picture indicating significant associations between technology-supported learning environments and Attitude Towards Technology.

Table 9

Associations between the TROFLEI Scales and Attitude Towards Technology in terms of Simple Correlation (r), Multiple Correlation (R) and Standardized Regression Coefficient (β) in the Preferred Form.

Scale Name	Attitude Towards Technology	
	r	*β*
Student Cohesiveness	0.29**	0.30
Teacher Support	0.13	- 0.10
Involvement	0.20*	0.04
Task Orientation	0.41**	0.16
Investigation	0.31**	0.09
Cooperation	0.31**	- 0.01
Equity	0.35**	0.76
Differentiation	0.28**	- 0.05
Technology Teaching	0.47**	0.34**
Multiple Correlation	$R = 0.52^{***}$	
	$R^2 = 0.27$	

**** Significant at p<0.001, ** Significant at p<0.01, * Significant at p<0.05*

The results from Table 9 indicate that for simple correlation (r) eight scales out of nine scales of TROFLEI were statistically significant. These were Student Cohesiveness, Involvement, Task Orientation, Cooperation, Equity, Differentiation and Technology Teaching Scales. The value of multiple correlation (R) between students' perceptions as measured by the

different scales of the TROFLEI and the Attitude Towards Technology scale was 0.52 which was statistically significant. The R^2 value indicates that 27 percent of the variance in the students' attitude towards Technology can be attributed to the student's perception of technology-supported learning environment. To provide information about the unique contribution of each learning environment scale to the Attitude towards Technology scale, Standardized Regression values were calculated. Regression coefficient values (β) indicate that one of the nine TROFLEI scales i.e. Technology Teaching (0.34) uniquely accounts for significant ($p<0.001$) amount of variance in students' attitude towards technology. This means the Technology Teaching was an independent predictor of individual students' attitude towards technology usage in teacher education classrooms in the selected NAAC accredited Colleges of Education.

Gender Differences

The last research objective was to investigate whether gender differences exist in students' perceptions of their technology-supported learning environments in a Teacher Education classroom and their attitude towards technology. In the present sample of 150 students taken from two NAAC Accredited colleges of Education, there were 39 (26%) male students and 111 (74%) female students who studied in a technology-supported learning environment in a teacher education classroom. In this section, the gender differences that exist in teacher education classrooms and their attitude towards technology have been discussed.

Gender Differences and Actual Technology-Supported Learning Environments

The means and standard deviations for each of the male and female groups were computed followed by a test of significance of difference between means (t-test for independent samples) on the nine scales of the actual form of TROFLEI. The data obtained were presented in Table 10.

From the information given in Table 10, it can be seen that out of the nine scales of the TROFLEI only one scale, i.e. Involvement scale with a t value of 2.08 was statistically significant ($p<0.05$). In the Involvement scale, males have a higher mean score than females. This means that male students show more Involvement within their group and help and support from teachers in a technology-supported teacher education classroom environment. Figure 3 depicts the respective means of male and female students on the nine scales of TROFLEI

Table 10

Means, Standard Deviations and Significance of Difference Between Means for Gender Differences in Students' Perceptions of Learning Environment as Measured by the Actual form of the Modified TROFLEI.

Scale	Gender	Mean	Mean Difference (M-F)	Standard Deviation	*t*
Student Cohesiveness	Males	3.86	-0.01	0.65	0.06
	Females	3.87		0.67	
Teacher Support	Males	3.46	0.16	0.61	1.25
	Females	3.30		0.78	
Involvement	Males	3.55	0.21	0.49	2.08*
	Females	3.34		0.62	
Task Orientation	Males	3.69	0.04	0.69	0.31
	Females	3.65		0.74	
Investigation	Males	3.72	0.26	0.70	1.91
	Females	3.46		0.70	
Cooperation	Males	3.83	0.06	0.72	0.43
	Females	3.77		0.78	
Equity	Males	3.75	0.21	0.62	1.68
	Females	3.54		0.77	
Differentiation	Males	3.38	-0.14	0.49	1.30
	Females	3.52		0.76	
Technology Teaching	Males	3.41	-0.07	0.80	0.51
	Females	3.48		0.81	

** Significant at p<0.05 Males: n = 39; Females: n = 111*

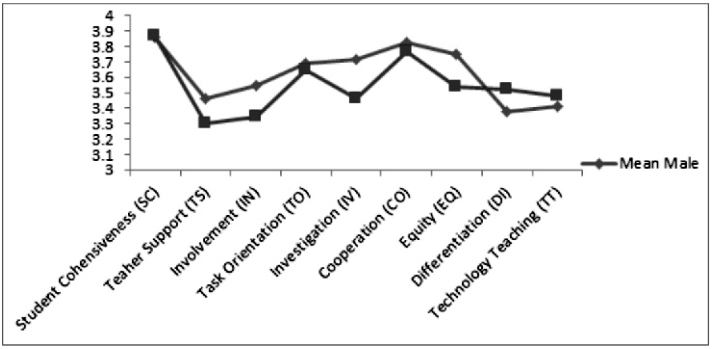

Figure 3. Graphical representation of mean in the Actual form of male and female students on the nine scales of the TROFLEI.

Gender Differences and Preferred Technology-Supported Learning Environments

The means and standard deviations for each of the male and female groups were computed followed by a test of significance of difference between means (t-test for independent samples) on the nine scales of the Preferred form of TROFLEI. The data obtained were presented in Table 11. Results in Table 11 show that there were no significant differences between the males and females in the preferred form of TROFLEI. This means that boys and girls of both the NAAC accredited colleges of education perceive technology-supported learning environments in a similar manner. The data was presented graphically in Figure 4.

Table 11
Means, Standard Deviations and Significance of Difference Between Means for Gender Differences in Students' Perceptions of Learning Environment as Measured by the Preferred form of the Modified TROFLEI.

Scale	Gender	Mean	Mean Difference (M-F)	Standard Deviation	*t*
Student Cohesiveness	Males	3.92	-0.04	0.58	0.31
	Females	3.96		0.69	
Teacher Support	Males	3.68	0.07	0.72	0.49
	Females	3.61		0.84	
Involvement	Males	3.71	-0.01	0.63	0.05
	Females	3.72		0.73	
Task Orientation	Males	3.79	-0.13	0.71	0.95
	Females	3.92		0.69	
Investigation	Males	3.72	0.26	0.70	1.91
	Females	3.46		0.70	
Cooperation	Males	3.83	-0.17	0.79	1.19
	Females	4.00		0.71	
Equity	Males	4.00	0.11	0.64	0.89
	Females	3.89		0.69	
Differentiation	Males	3.74	-0.15	0.71	1.11
	Females	3.89		0.74	
Technology Teaching	Males	3.87	0.02	0.81	0.16
	Females	3.85		0.74	

Males: n = 39; Females: n = 111

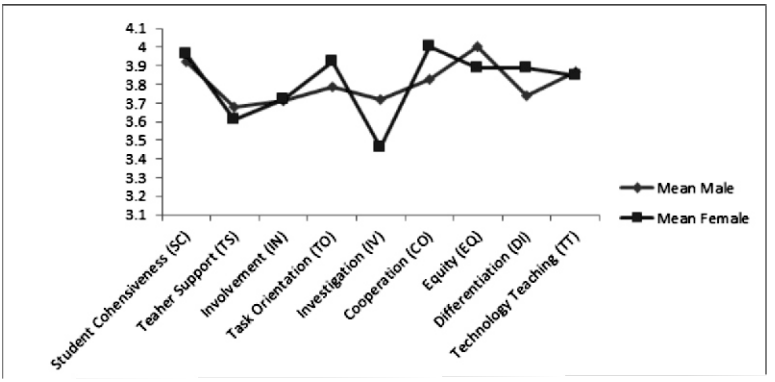

Figure 4. Graphical representation of mean in the preferred form of male and female students on the nine scales of the TROFLEI.

Gender Differences on Attitude Towards Technology.

Gender differences on attitude towards technology were also investigated. The means and standard deviations for the two groups were computed followed by a significance of the difference between means (t-test), to find out gender differences on the Attitude Towards Technology. The data is shown in Table 12.

Table 12

Means, Standard Deviations and Significance of Difference between Means for Gender Differences in Attitude Towards Technology.

Scale	Gender	Mean	Mean Difference (M-F)	Standard Deviation	*t*
Attitude Towards Technology	Males	3.41	-0.01	0.52	0.14
	Females	3.42		0.65	

From the data analysis it is evident that there were no gender differences between male and female students in their attitude towards technology, which shows that boys and girls have the same attitude towards technology in the technology supported teacher education classroom.

CONCLUSIONS

The present study contributed towards the reliability and validity of the Technology-Rich Outcome-Focused Learning Environment Inventory (TROFLEI) for assessing students' perceptions of their actual and preferred classroom learning environments in a technology-supported teacher education classroom in Jammu city. This research, by examining the learning

environments and its impact on student attitudes towards technology, has the potential to provide information to teachers on how technology can be used in creating a healthy learning environment and promoting improved learner outcomes. The reactions of students towards studying teacher education courses through the technology-supported classroom were also investigated and students expressed the opinion that they found learning teacher education through technology to be more fun and a more enjoyable activity than in the regular classroom. They were more relaxed and were able to learn faster. The implications for teachers as outlined in this study suggest that teachers should use technology in order to create a healthy learning environment which promotes learning and improves the quality of the teaching learning process. The findings of this research can be broadly applied to the study of the learning environments in areas other than teacher education such as psychological foundation of education, educational measurement and evaluation etc. by researchers and practitioners of education.

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