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Relationship among Contexts Knowledge (CK1), Technological Pedagogical Content Knowledge (TPCK) and Attitude towards Creative Teaching for Pre-Service Trainee Teachers: A Study on Mathematics Method Subject

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ABSTRACT:

Present study is dealt with the determination of relationship among three variables Contexts Knowledge (CK1), Technological Pedagogical Content Knowledge (TPCK) and Attitude towards Creative Teaching (ACT) considering two variables at a time. Five hypotheses and fifteen sub-hypotheses are considered for the study. A descriptive survey type research is conducted for this particular study. One hundred trainee teachers are selected randomly from twenty teacher training institution. Data has been collected by administering the scales TPACK-Math Scale developed by ÖNAL (2016) and Attitude Scale of Creative Teaching (ASCT-s) developed by Shukla (2016). Coefficient of correlation is calculated to test these hypotheses and for majority of the cases significant relationship is found. In most of the cases significant relationships are observed.

Keyword: - Contexts Knowledge, Technological Pedagogical Content Knowledge, Creative Teaching, Pre-service Trainee Teachers, Mathematics Method.

I. INTRODUCTION

The purpose of this study was to examine the relationship among CK1, TPCK, and ACT for pre-service trainee teachers, with a focus on the mathematics method subject. The study aimed to investigate whether there is a significant relationship between these three variables in the teaching learning process in the real classroom situation and whether this relationship varies based on gender and location (rural/urban).

Technological Pedagogical Content Knowledge (TPCK) refers to the knowledge and skills that teachers need to effectively integrate technology into their teaching of subject-specific content. TPCK includes

knowledge of the content, pedagogical strategies, and technology tools that can enhance teaching and learning. The integration of technology into teaching and learning is becoming increasingly important in today's world. However, it is not enough for teachers to simply use technology in their classrooms; they must also have the knowledge and skills to use it effectively in combination with their pedagogical and content knowledge. This integration of technology, pedagogy, and content knowledge is known as Technological Pedagogical Content Knowledge (TPCK) (Mishra & Koehler, 2006). Attitude towards creative teaching is a crucial aspect of teacher education. B.Ed. trainee teachers' attitude towards creative teaching can impact their classroom practices, which, in turn, affects students' learning outcomes.it is an approach that emphasizes the use of innovative and imaginative methods to engage students in learning. In other hand, Contexts Knowledge (CK) refers to teachers' understanding of the contextual factors that may influence their teaching and their students' learning. This includes knowledge of the social, cultural, and institutional contexts in which teaching and learning take place. Teachers with strong CK are better able to adapt their teaching to meet the needs of their students and to create an inclusive and engaging learning environment. There is a growing body of research that suggests a positive relationship between teachers' attitudes towards creative teaching and their levels of CK. Teachers who have a better understanding of the contextual factors of technology that influence their teaching are more likely to be open to using creative teaching strategies and to be effective in implementing them. They are also more likely to recognize the value of creative teaching for promoting student engagement and learning. Research has shown that creative teaching enhances students' motivation, interest, and engagement in learning. Therefore, it is important that B.Ed. trainee teachers develop a positive attitude towards creative teaching.

II. LITERATURE REVIEW

Holmes (2009) has conducted a research titled "Planning to Teach with Digital Tools: Introducing the Interactive Whiteboard to Pre-Service Secondary Mathematics Teachers". This study looked at the lesson plans created by a group of pre-service secondary maths teachers in their final year of undergraduate education (n=13). The Technological Pedagogical Content Knowledge (TPCK) framework developed by Mishra and Koehler (2006) serves as the analysis's main framework the study shows that the pre-service teachers displayed developing TPCK because of their ability to plan skillfully to integrate IWB features into their arithmetic lectures. They discovered that the technology's main advantages were to its potential to engage pupils with a variety of visual representations and virtual manipulative that can help conceptual understanding. In this regard, Pedagogical Content Knowledge (PCK) is also an important part of study mentioned by Sen and Samanta (2015a; 2015b; 2015c; 2015d) and Sen (2016; 2022).

"A Qualitative Approach to Assessing Technological Pedagogical Content Knowledge" by Groth et al. (2009) provides an investigation into a proposal that draws on qualitative data generated throughout lesson study cycles to evaluate instructors' growth in technology pedagogical content knowledge. Written lesson plans from teachers, reviews of lessons by university faculty members, transcripts and videos of lessons actually taught, and recordings and transcripts of debriefing sessions concerning actually taught lessons are

just a few examples of the specific qualitative data sources. These data sources are used to draw conclusions about instructors' technology pedagogical content understanding and to validate those conclusions.

Guerrero (2010) is done a study named "Technological Pedagogical Content Knowledge in the Mathematics Classroom". Using four key knowledge areas that are essential for technology-using mathematics teachers, this essay places TPACK in the mathematics classroom. In order to draw a conclusion, this article presents a picture of effective TPACK in action and poses issues for technology-using instructors to think about before beginning to utilize technology to enhance mathematics instruction.

Niess et al.'s (2010) study, "Knowledge Growth in Teaching Mathematics/Science with Spreadsheets", looked at the development of in-service K–8 teachers' pedagogical content knowledge (PCK) towards technology, pedagogy, and content knowledge (TPACK) in an online graduate course created for integrating dynamic spreadsheets as teaching and learning tools in mathematics and science. The analysis describes teachers' growth from recognizing to adopting, adjusting, and exploring TPACK levels via the lens of four TPACK components (Niess, 2005). To enhance in-service teachers' knowledge growth for teaching using technology, implications and recommendations for the design of future professional development courses and ongoing research are identified.

In their study "Attitude of B. Ed. Pupil-Teachers of Science and Arts Stream Towards Creative Teaching," Gupta and Jan (2013) noted that the goal of the study was to evaluate and compare the attitudes of B. Ed. pupil-teachers from the science and art streams towards creative teaching. Utilizing a stratified random sampling technique, 200 B.Ed. student-teachers were selected from five universities in the Sambhal area. Using Shukla's Attitude Scale of Creative Teaching, attitudes towards creative teaching were measured. (2012). The study found that student teachers in the scientific stream of the B. Ed. programme have a more favourable attitude towards creative teaching than their peers in the arts stream, and that female student teachers have a more positive attitude than male student teachers.

Pre-service teachers' development of technological pedagogical content knowledge (TPACK) and conceptions of learning and teaching with technology are examined in the study "Pre-Service Teachers' TPACK Development and Conceptions through a TPACK-Based Course" by Özgün-Koca et al. (2009/2010). Researchers created and constructed a computer-based mathematics course based on a TPACK framework with this objective in mind. A parallel mixed method technique was employed as the research methodology. 71 pre-service teachers who were enrolled in the course provided the data. Data gathering tools comprised the TPACK survey, a semi-structured interview, and evaluation ratings of pre-service teachers' microteaching performance, which also included lesson plan analysis. The results showed that the applied instructional processes had a favourable impact on the TPACK development of pre-service teachers. Before and after the course's implementation, there were noticeable differences in terms of technology knowledge, technological content knowledge, technological pedagogical knowledge, and TPACK in general.

A study named "Attitude of B. Ed. Student-towards Creative Teaching: A Study of Science and Arts Stream Teachers" was conducted by Kumar (2013). The study was conducted to assess and compare the

perspectives of B. Ed. student teachers from the science and art streams regarding creative instruction. The stratified random selection technique was used to choose 200 B.Ed. student teachers from five colleges in the Indian state of Haryana. Using the Dr. R. P. Shukla-developed Attitude Scale of Creative Teaching, attitudes towards creative teaching were evaluated. According to the study, B. Ed. student teachers in the science stream had a more favourable attitude towards creative teaching than their peers in the arts stream, and female student teachers likewise have a more positive attitude than male student teachers.

In a research article titled "Attitude of B.Ed. Students towards Creative Teaching in Relation to Certain Background Factors", Kaur (2015) conducted a study on creative teaching. 180 B. Ed. students made up the sample for the current study, and data were gathered using Shukla's (2012) Attitude Scale towards Creative Teaching. The analysis of the data showed that there is a significant difference in B. Ed. students' attitudes towards creative teaching depending on locality, such as urban and rural, as well as stream of study, such as arts and science, but no significant difference was found between the attitudes of male and female B. Ed. students towards creative teaching.

In their work titled "Attitude of Pre-Service Teachers towards Creative Teaching", Sethi and Kaur (2015) examined pre-service teachers' attitudes towards creative teaching. 200 B. Ed. student instructors were randomly selected from educational colleges in the city of Ludhiana. Shukla's (2008) Attitude Scale of Creative Teaching was applied. According to the findings, pre-service teachers in the scientific stream are supportive of creative teaching than those in the humanities and commerce streams.

III. RATIONALE OF THE STUDY

Relationship among Contexts Knowledge (CK1), TPCK and Attitude towards Creative Teaching (ACT) is very important for pre-service trainee teachers, having Mathematics as method subject, in the purview of gender and residency.

IV. OBJECTIVES OF THE STUDY

Following objectives are taken in to consideration-

(i) To study the relationship among Contexts Knowledge, TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers.

(ii) To study the relationship among Contexts Knowledge, TPCK and Attitude towards Creative Teaching of the Male Pre-Service Mathematics Trainee Teachers.

(iii) To study the relationship among Contexts Knowledge, TPCK and Attitude towards Creative Teaching of the Female Pre-Service Mathematics Trainee Teachers.

(iv) To study the relationship among Contexts Knowledge, TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in urban area.

(v) To study the relationship among Contexts Knowledge, TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in rural area.

V. HYPOTHESIS OF THE STUDY

Following hypotheses may be considered for the present study.

$H_0$1: There is no significance relation among Contexts Knowledge, TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers.

$H_0$1 may be divided into three sub-hypotheses as follows:

$H_0$1a: There is no significance relation between Contexts Knowledge (CK1) and TPCK of the Pre-Service Mathematics Trainee Teachers.

$H_0$1b: There is no significance relation between Contexts Knowledge (CK1) and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers.

$H_0$1c: There is no significance relation between TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers.

$H_0$2: There is no significance relation among Contexts Knowledge (CK1), TPCK and Attitude towards Creative Teaching of the Male Pre-Service Mathematics Trainee Teachers.

$H_0$2 may be divided into three sub-hypotheses as follows:

$H_0$2a: There is no significance relation between Contexts Knowledge (CK1) and TPCK of the Male Pre-Service Mathematics Trainee Teachers.

$H_0$2b: There is no significance relation between Contexts Knowledge (CK1) and Attitude towards Creative Teaching of the Male Pre-Service Mathematics Trainee Teachers.

$H_0$2c: There is no significance relation between TPCK and Attitude towards Creative Teaching of the Male Pre-Service Mathematics Trainee Teachers.

$H_0$3: There is no significance relation among Contexts Knowledge (CK1), TPCK and Attitude towards Creative Teaching of the female Pre-Service Mathematics Trainee Teachers.

$H_0$3a: There is no significance relation between Contexts Knowledge (CK1) and TPCK of the Female Pre-Service Mathematics Trainee Teachers.

$H_0$3b: There is no significance relation between Contexts Knowledge (CK1) and Attitude towards Creative Teaching of the Female Pre-Service Mathematics Trainee Teachers.

$H_0$3c: There is no significance relation between TPCK and Attitude towards Creative Teaching of the Female Pre-Service Mathematics Trainee Teachers.

$H_0$4: There is no significance relation among Contexts Knowledge (CK1), TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in urban area.

$H_0$4 may be divided into three sub-hypotheses as follows:

$H_0$4a: There is no significance relation between Contexts Knowledge (CK1) and TPCK of the Pre-Service Mathematics Trainee Teachers in urban area.

$H_0$4b: There is no significance relation between Contexts Knowledge (CK1) and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teacher in urban area.

$H_0$4c: There is no significance relation between TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in urban area.

$H_0$5: There is no significance relation among Contexts Knowledge (CK1), TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in rural area.

$H_0$5 may be divided into three sub-hypotheses as follows:

$H_0$5a: There is no significance relation between Contexts Knowledge (CK1) and TPCK of the Pre-Service Mathematics Trainee Teachers in rural area.

.**$H_0$5b:** There is no significance relation between Contexts Knowledge (CK1) and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teacher in rural area.

$H_0$5c: There is no significance relation between TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in rural area.

VI. METHODOLOGY

(i) **Research Design:** The research design that can be used for this study is a correlational research design. This design will allow the researcher to examine the relationship between the three variables (Context Knowledge, TPCK and Attitude towards Creative Teaching by determining the coefficient correlation between them.

(ii) **Method:** Descriptive survey type research is conducted for the present study by the researcher.

(iii) **Population:** The Pre-service Mathematics B. Ed. trainee teachers in West Bengal Rarh Region (Purulia, Bankura, Jhargram and Birbhum Districts) are considered as population.

(iv) **Sample and Sampling:** In this study, 100 (One hundred) Pre- Service Mathematics B. Ed. trainee teachers selected by simple random sampling from the twenty teachers training institutions which are also selected by simple random sampling from Rarh Region (Purulia, Bankura, Jhargram & Birbhum Districts).

(v) Tool: The researcher used two standardized tools for data collection from Pre- Service Mathematics B. Ed. trainee teachers are mention below-.

(a) Technological Pedagogical Content Knowledge Scale (TPACK-Math) developed by ÖNAL (2016).

(b) Attitude Scale of Creative Teaching (ASCT-s) developed by Shukla (2016).

(vi) Statistics Used: Data analysis is done using the statistical software SPSS 26. Inferential statistics is applied for computing correlation among Contexts Knowledge, TPCK and Attitude towards Creative Teaching.

VII. RESULTS AND DISCUSSIONS

Table 1: *Correlations among Contexts Knowledge, TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers.*

Correlations				
		CK1	TPCK	ACT
CK1	Pearson Correlation	1	.592**	.109
	Sig. (2-tailed)		.000	.280
	N	100	100	100
TPCK	Pearson Correlation	.592**	1	.284**
	Sig. (2-tailed)	.000		.004
	N	100	100	100
ACT	Pearson Correlation	.109	.284**	1
	Sig. (2-tailed)	.280	.004	
	N	100	100	100
**. Correlation is significant at the 0.01 level (2-tailed).				

From table 1, it is found that the value of coefficient of correlation is 0.592 between Contexts Knowledge (CK1) and Technological Pedagogical and Content Knowledge (TPCK), which is significant at 0.01 level significance. So, significant relationship is found between CK1 and TPCK of the Pre-Service Mathematics Trainee Teachers of Rarh Region of West Bengal. So, the sub-null hypothesis ($H_0$1a) of the null hypothesis ($H_0$1) "There is no significance relation between Contexts Knowledge (CK1) and TPCK of the Pre-Service Mathematics Trainee Teachers" stands rejected. As a result alternative hypothesis with respect to null hypothesis ($H_0$1a) which states that, "There is significance relation between Contexts Knowledge (CK1) and TPCK of the Pre-Service Mathematics Trainee Teachers" is accepted.

From table 1, it is also found that the value of coefficient of correlation is 0.109 between Contexts Knowledge (CK1) and Attitude towards Creative Teaching, which is not significant at 0.05 level of significance. So, significant relationship is not found between CK1 and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers of Rarh Region of West Bengal. So, the sub-null hypothesis ($H_0$1b) of the null hypothesis ($H_0$1) "There is no significance relation between Contexts Knowledge (CK1) and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers" is accepted.

From table 1, it is found that the value of coefficient of correlation is 0.284 between Technological Pedagogical and Content Knowledge (TPCK) and Attitude towards Creative Teaching, which is significant at 0.01 level of significance. So, significant relationship is found between TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers of Rarh Region of West Bengal. So, the sub-null hypothesis ($H_0$1c) of the null hypothesis ($H_0$1) "There is no significance relation between TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers" is rejected.

As a result alternative hypothesis with respect to null hypothesis ($H_0$1c) which states that, "There is significance relation between TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers" is accepted.

Table 2: *Correlations among Contexts Knowledge, TPCK and Attitude towards Creative Teaching of the Male Pre-Service Mathematics Trainee Teachers.*

Correlations				
		CK1	TPCK	ACT
CK1	Pearson Correlation	1	.739**	.178
	Sig. (2-tailed)		.000	.174
	N	60	60	60
TPCK	Pearson Correlation	.739**	1	.295*
	Sig. (2-tailed)	.000		.022
	N	60	60	60
ACT	Pearson Correlation	.178	.295*	1
	Sig. (2-tailed)	.174	.022	
	N	60	60	60
**. Correlation is significant at the 0.01 level (2-tailed).				
*. Correlation is significant at the 0.05 level (2-tailed).				

From table 2, it is found that the value of coefficient of correlation is 0.739 between Contexts Knowledge (CK1) and Technological Pedagogical and Content Knowledge (TPCK), which is significant at 0.01 level significance. So, significant relationship is found between CK1 and TPCK of the Male Pre-Service Mathematics Trainee Teachers of Rarh Region of West Bengal. So, the sub-null hypothesis ($H_0$2a) of the null hypothesis ($H_0$2) "There is no significance relation between Contexts Knowledge (CK1) and TPCK of the Male Pre-Service Mathematics Trainee Teachers" stands rejected. As a result alternative hypothesis with respect to null hypothesis ($H_0$2a) which states that, "There is significance relation between Contexts Knowledge (CK1) and TPCK of the Male Pre-Service Mathematics Trainee Teachers" is accepted.

From table 2, it is also found that the value of coefficient of correlation is 0.178 between Contexts Knowledge (CK1) and Attitude towards Creative Teaching, which is not significant at 0.05 level of significance. So, significant relationship is not found between CK1 and Attitude towards Creative Teaching of the Male Pre-Service Mathematics Trainee Teachers of Rarh Region of West Bengal. So, the sub-null hypothesis ($H_0$2b) of the null hypothesis ($H_0$2) "There is no significance relation between Contexts Knowledge (CK1) and Attitude towards Creative Teaching of the Male Pre-Service Mathematics Trainee Teachers" stands accepted.

From table 2, it is found that the value of coefficient of correlation is 0.295 between Technological Pedagogical and Content Knowledge (TPCK) and Attitude towards Creative Teaching, which is significant at 0.05 level of significance. So, significant relationship is found between TPCK and Attitude towards Creative Teaching of the Male Pre-Service Mathematics Trainee Teachers of Rarh Region of West Bengal. So, the sub-null hypothesis ($H_0$2c) of the null hypothesis ($H_0$2) "There is no significance relation between TPCK and Attitude towards Creative Teaching of the Male Pre-Service Mathematics Trainee Teachers"

stands rejected. As a result alternative hypothesis with respect to null hypothesis ($H_0$2c) which states that, "There is significance relation between TPCK and Attitude towards Creative Teaching of the Male Pre-Service Mathematics Trainee Teachers" is accepted.

Table 3: *Correlations among Contexts Knowledge, TPCK and Attitude towards Creative Teaching of the Female Pre-Service Mathematics Trainee Teachers.*

Correlations				
		CK1	TPCK	ASCT
CK1	Pearson Correlation	1	.349*	-.012
	Sig. (2-tailed)		.027	.944
	N	40	40	40
TPCK	Pearson Correlation	.349*	1	.277
	Sig. (2-tailed)	.027		.084
	N	40	40	40
ASCT	Pearson Correlation	-.012	.277	1
	Sig. (2-tailed)	.944	.084	
	N	40	40	40
*. Correlation is significant at the 0.05 level (2-tailed).				

From table 3, it is found that the value of coefficient of correlation is 0.349 between Contexts Knowledge (CK1) and Technological Pedagogical and Content Knowledge (TPCK), which is significant at 0.05 level of significance. So, significant relationship is found between CK1 and TPCK of the Female Pre-Service Mathematics Trainee Teachers of Rarh Region of West Bengal. So, the sub-null hypothesis ($H_0$3a) of the null hypothesis ($H_0$3) "There is no significance relation between Contexts Knowledge (CK1) and TPCK of the Female Pre-Service Mathematics Trainee Teachers" stands rejected. As a result alternative hypothesis with respect to null hypothesis ($H_0$3a) which states that, "There is no significance relation between Contexts Knowledge (CK1) and TPCK of the Female Pre-Service Mathematics Trainee Teachers" is accepted.

From table 3, it is also found that the value of coefficient of correlation is -0.02 between Contexts Knowledge (CK1) and Attitude towards Creative Teaching, which is not significant at 0.05 level of significance. So, significant relationship is not found between CK1 and Attitude towards Creative Teaching of the Female Pre-Service Mathematics Trainee Teachers of Rarh Region of West Bengal. So, the sub-null hypothesis ($H_0$3b) of the null hypothesis ($H_0$3) "There is no significance relation between Contexts Knowledge (CK1) and Attitude towards Creative Teaching of the Female Pre-Service Mathematics Trainee Teachers" stands accepted.

From table 3, it is found that the value of coefficient of correlation is 0.277between Technological Pedagogical and Content Knowledge (TPCK) and Attitude towards Creative Teaching, which is not significant at 0.05 level of significance. So, significant relationship is not found between TPCK and Attitude towards Creative Teaching of the Female Pre-Service Mathematics Trainee Teachers of Rarh Region of West Bengal. So, the sub-null hypothesis ($H_0$3c) of the null hypothesis ($H_0$3) "There is no significance

relation between TPCK and Attitude towards Creative Teaching of the Female Pre-Service Mathematics Trainee Teachers" is accepted.

Table 4: *Correlations among Contexts Knowledge, TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in urban area.*

Correlations				
		CK1	TPCK	ASCT
CK1	Pearson Correlation	1	.707**	.161
	Sig. (2-tailed)		.000	.441
	N	25	25	25
TPCK	Pearson Correlation	.707**	1	.484*
	Sig. (2-tailed)	.000		.014
	N	25	25	25
ASCT	Pearson Correlation	.161	.484*	1
	Sig. (2-tailed)	.441	.014	
	N	25	25	25
**. Correlation is significant at the 0.01 level (2-tailed).				
*. Correlation is significant at the 0.05 level (2-tailed).				

From table 4, it is found that the value of coefficient of correlation is 0.707 between Contexts Knowledge (CK1) and Technological Pedagogical and Content Knowledge (TPCK), which is significant at 0.01 level significance. So, significant relationship is found between CK1 and TPCK of the Pre-Service Mathematics Trainee Teachers in urban areas of Rarh Region of West Bengal. So, the sub-null hypothesis ($H_0$4a) of the null hypothesis ($H_0$4) "There is no significance relation between Contexts Knowledge (CK1) and TPCK of the Pre-Service Mathematics Trainee Teachers in urban areas" stands rejected. As a result alternative hypothesis with respect to null hypothesis ($H_0$4a) which states that, "There is significance relation between Contexts Knowledge (CK1) and TPCK of the Pre-Service Mathematics Trainee Teachers in urban areas" is accepted.

From table 4, it is also found that the value of coefficient of correlation is 0.161 between Contexts Knowledge (CK1) and Attitude towards Creative Teaching, which is not significant at 0.05 level of significance. So, significant relationship is not found between CK1 and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in urban areas of Rarh Region of West Bengal. So, the sub-null hypothesis ($H_0$4b) of the null hypothesis ($H_0$4) "There is no significance relation between Contexts Knowledge (CK1) and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in urban areas" stands accepted.

From table 4, it is found that the value of coefficient of correlation is 0.484 between Technological Pedagogical and Content Knowledge (TPCK) and Attitude towards Creative Teaching, which is significant at 0.05 level of significance. So, significant relationship is found between TPACK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in urban areas of Rarh Region of West Bengal. So, the sub-null hypothesis ($H_0$4c) of the null hypothesis ($H_0$4) "There is no significance relation

between TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in urban areas" is rejected. As a result alternative hypothesis with respect to null hypothesis ($H_0$4c) which states that, "There is significance relation between TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in urban areas" is accepted.

Table 5: *Correlations among Contexts Knowledge, TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in rural area.*

Correlations				
		CK1	TPCK	ASCT
CK1	Pearson Correlation	1	.571**	.103
	Sig. (2-tailed)		.000	.378
	N	75	75	75
TPCK	Pearson Correlation	.571**	1	.240*
	Sig. (2-tailed)	.000		.038
	N	75	75	75
ASCT	Pearson Correlation	.103	.240*	1
	Sig. (2-tailed)	.378	.038	
	N	75	75	75
**. Correlation is significant at the 0.01 level (2-tailed).				
*. Correlation is significant at the 0.05 level (2-tailed).				

From table 5, it is found that the value of coefficient of correlation is 0.571 between Contexts Knowledge (CK1) and Technological Pedagogical and Content Knowledge (TPCK), which is significant at 0.01 level significance. So, significant relationship is found between CK1 and TPCK of the Pre-Service Mathematics Trainee Teachers in rural areas of Rarh Region of West Bengal. So, the sub-null hypothesis ($H_0$5a) of the null hypothesis ($H_0$5) "There is no significance relation between Contexts Knowledge (CK1) and TPCK of the Pre-Service Mathematics Trainee Teachers in rural areas" stands rejected. As a result alternative hypothesis with respect to null hypothesis ($H_0$5a) which states that, "There is significance relation between Contexts Knowledge (CK1) and TPCK of the Pre-Service Mathematics Trainee Teachers in rural areas" is accepted.

From table 5, it is also found that the value of coefficient of correlation is 0.103 between Contexts Knowledge (CK1) and Attitude towards Creative Teaching, which is not significant at 0.05 level of significance. So, significant relationship is not found between CK1 and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in rural areas of Rarh Region of West Bengal. So, the sub-null hypothesis ($H_0$5b) of the null hypothesis ($H_0$5) "There is no significance relation between Contexts Knowledge (CK1) and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in rural areas" stands accepted.

From table 5, it is found that the value of coefficient of correlation is 0.240 between Technological Pedagogical and Content Knowledge (TPCK) and Attitude towards Creative Teaching, which is significant at 0.05 level of significance. So, significant relationship is found between TPCK and Attitude towards

Creative Teaching of the Pre-Service Mathematics Trainee Teachers in rural areas of Rarh Region of West Bengal. So, the sub-null hypothesis ($H_0$5c) of the null hypothesis ($H_0$5) "There is no significance relation between TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in rural areas" stands rejected. As a result alternative hypothesis with respect to null hypothesis ($H_0$5c) which states that, "There is significance relation between TPCK and Attitude towards Creative Teaching of the Pre-Service Mathematics Trainee Teachers in rural areas" is accepted.

VIII. FINDINGS OF THE RESULTS

Variables	Total	Male	Female	Urban	Rural
CK1 & TPCK	Significant Relationship	Significant Relationship	Significant Relationship	Significant Relationship	Significant Relationship
CK1 & ACT	Insignificant Relationship	Insignificant Relationship	Insignificant Relationship	Insignificant Relationship	Insignificant Relationship
TPCK & ACT	Significant Relationship	Significant Relationship	Insignificant Relationship	Significant Relationship	Significant Relationship

IX. DISCUSSION

There is a significance relationship between Context Knowledge (CK1) and TPCK for total sample, male, female, urban, rural. As these two knowledge bases are interrelated, contexts knowledge (CK1) is considered as a component of TPACK- Math Scale.

Contexts Knowledge (CK1) and Attitude towards Creative Teaching (ACT) are not significantly related to each other for dichotomous variables like male – female, rural-urban and total sample. From result, it may be concluded that CK1 is independent of ACT.

There is significant relationship is found between TPCK and ACT for total sample and similar result is recorded for male trainee teachers, trainee teachers who residing in both rural and urban area, but relationship is insignificant for only female trainee teachers.

X. CONCLUSIONS

It may be concluded that Contexts Knowledge (CK1) is very important measure because there is a significant relationship between CK1 and TPCK. In this scale validity of including CK1 in TPACK-Math Scale of is supported this study. This indicates that CK1 is an important component of TPACK-Math Scale, as it is interrelated with other knowledge bases.

The results show that Contexts Knowledge (CK1) and Attitude towards Creative Teaching (ACT) are not significantly related to each other for dichotomous variables such as male-female, rural-urban, and the total sample. Therefore, it can be concluded that CK1 is independent of ACT.

The study also found a significant relationship between TPCK and ACT for the total sample, male trainee teachers, and trainee teachers residing in both rural and urban areas. However, this relationship was found to

be insignificant for female trainee teachers. This suggests that the relationship between TPCK and ACT may vary based on gender, but further research is needed to confirm this.

Overall, these findings highlight the importance of Context Knowledge (CK1) and Attitude towards Creative Teaching (ACT) in the development of effective teaching practices, particularly in the context of mathematics education. Further research is needed to explore the relationship between these factors in more detail, as well as to examine other potential factors that may influence the development of effective teaching practices.

XI. ACKNOWLEDGMENT

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XII. REFERENCES

Groth, R., Spickler, D., Bergner, J., & Bardzell, M.(2009). A qualitative approach to assessing technological pedagogical content knowledge. Contemporary Issues in Technology & Teacher Education, 9(4), 392-411. Retrieved from http://www.citejournal.org/vol9/iss4/mathematics/article1.cfm

Guerrero, S. (2010). Technological Pedagogical Content Knowledge in the mathematics classroom. Journal of Digital Learning in Teacher Education, 26(4), 132-139.

Gupta, S. & Jan, A. (2013). Attitude of B. Ed. Pupil-Teachers of Science and Arts Stream towards Creative Teaching: A study, International Journal of Advancement in Education and Social Science, Vol. 1. No.1, P.P. 36 -11.

Holmes, Kathryn. (2009). Planning to teach with digital tools: Introducing the interactive whiteboard to pre-service secondary mathematics teachers. Australasian Journal of Educational Technology. 25. 351-365. 10.14742/ajet.1139.

Kaur, S.(2015). Attitude of B. Ed. Students Towards Creative Teaching in Relation to Certain Background Factors, Indian Journal of Applied Research, Vol. 5, P.P. 227-229.

Kumar, S. (2013). Attitude of B. Ed. Student-Towards Creative Teaching: A study of science and arts stream teachers, Global International Research Thought, P.P. 89-98.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. Teachers College Record, 108(6), 1017-1054.

Niess, M. L. (2005). Preparing teachers to teach science and mathematics with technology: Developing a technology pedagogical content knowledge. Teaching and Teacher Education, 21(5), 509–523.

Niess, M. L., van Zee, E. H., & Gillow-Wiles, H. (2010). Knowledge growth in teaching mathematics/science with spreadsheets: Moving PCK to TPACK through online professional development. Journal of Digital Learning in Teacher Education, 27(2), 42-52.

Önal, N. (2016). Development, validity and reliability of TPACK scale with pre-service mathematics teachers. International Online Journal of Educational Sciences, 8 (2), 93-107.

Özgün-Koca, A. A., Meagher, M., & Edwards, M. T. (2009/2010). Pre-service teachers' emerging TPACK in a technology-rich methods class. The Mathematics Educator, 19(2), 10-20. Retrieved from http://math.coe.uga.edu/TME/issues/v19n2/v19n2_OzgunKoca,%20Meagher,%20&%20Edwards.pdf

Sen, S. & Samanta, S. (2015a). Content Knowledge and Pedagogical Content Knowledge in the Sixth Grade Mathematics Textbook of West Bengal Board of Secondary Education. International Journal of Multidisciplinary Educational Research, 4(5(3)), 221-231.

Sen, S. & Samanta, S. (2015b). Content Knowledge and Pedagogical Content Knowledge in the Seventh Grade Mathematics Textbook of West Bengal Board of Secondary Education. International Journal of Multidisciplinary Research and Development, 2(9), 36-40.

Sen, S. & Samanta, S. (2015c). Content Knowledge and Pedagogical Content Knowledge in the Eighth Grade Mathematics Textbook of West Bengal Board of Secondary Education. Scholarly Research Journal for Interdisciplinary Studies, 3(19), 619-629.

Sen, S. & Samanta, S. (2015d). Content Knowledge and Pedagogical Content Knowledge in the Ninth Grade Mathematics Textbook of West Bengal Board of Secondary Education. International Journal of Multidisciplinary Research and Development, 2(11), 228-232.

Sen, S. (2016). Content Knowledge and Pedagogical Content Knowledge in the Tenth Grade Mathematics Textbook of West Bengal Board of Secondary Education. International Journal of Advanced Education and Research, 1(10), 11-17.

Sen, S. (2022). Content Knowledge and Pedagogical Content Knowledge in the Unit Graph of Ninth Grade Mathematics Textbook of West Bengal Board of Secondary Education. International Journal of Research Publication and Reviews, 3(1), 877-883.

Sethi, M. & Kaur, R. (2015). Attitude of Pre-service Teachers towards Creative Teaching, International Inventive Multidisciplinary Journal. Vol. 3, P.P. 11-15.

Shukla, R. P. (2016). Attitude Scale of Creative Teaching (ASCT-s), National Psychological Corporation: Agra.

Shukla, R.P. (2008). Manual for Attitude scale of creative teaching (ASCT), National psychological corporation, Agra.

Shukla, R.P. (2012). *'Manual for Attitude scale of Creative teaching'*, National psychological corporation, Agra.