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How do Self-Regulation and Retention in Math relate with Classroom Learning Environment: Students' Perspective

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Abstract

This study investigated relationhip of self-regulation (SR) with retention in Math and Classroom Learning Environment (CLE) through quantitative approach based on survey method. 10th grade students from Public Schools of Punjab were the population of the study. Using random sampling, 997 respondents (Boys = 489, Girls = 508) from two districts (conveniently) were selected. The CLE was explored by using WIHIC scale (Fraser, 2007). Self-Regulation scale (Zimmerman, 2008) measured students' self-regulation while for retention in mathematics, a scale developed by the researchers was used. For the whole sample, SR, CLE and Retention in Math, were positive and female students had similar perception regarding these variables with respect to their male counterparts. Findings revealed no significant relationship between CLE and SR of students for the whole sample as well; further, no significant relationship between CLE and students' retention in Math was found but it was significant for females as compared to males. This study should be conducted at large scale and in varied setting for further implications.

Keywords: Self-regulation (SR), Retention in Math, Classroom Learning Environment (CLE), Gender

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Introduction

It is the education which teach one's to think intensively for innovation in life. The students stay in a classroom for learning and spent there most of the time for teaching-learning process. Classroom is a place where the students advances with the intention of bright future and for this purpose, they acquired knowledge and skills to achieve this goal. This is a platform where they gain knowledge, skills considered necessary for prospering and succeed in the global society. For the nourishment of a student the classroom acts as an integral part. In order to gain maximum effectiveness in teaching it is compulsory to understand the patterns in which CLE affects the learners (Hannah, 2013).

The word learning has been embedded with numerous concepts, and meanings which best explains it and relate it with psychosocial environment of classroom (Mayhew, Grunwald & Dey, 2005, Kay & Kibble, 2016). As different researchers have different ideas about learning environment, Dorman (2002) is of the view that learning environment is an atmosphere, climate, habitat and locality. There are four basic elements of learning environment, culture, ecology, atmosphere linked with social system (Vosko, 1984).

Fraser (2007, 2012) has simultaneously proved quality learning environment of classroom pays important part for student's learning. When the learners perception regarding CLE is positive, then their learning becomes effective. As Hanrahan (2002) describes that the teaching methodology and research on science advises that energetic qualities of science classroom can live significant effects on alienating students even before they found the pursuits activities with the ideas of science. Modern researches in Psychology pays heed to develop self-confidence and self- regulation (SR) in abilities of learners (Zimmerman, 2008). In fact, accomplishment in science education paves the way to motivate the students by making the attitude strong and it results not only in learning but also producing sense of SR which is needed for future achievements.

Review Literature

The learning environment consists of three contexts named as social, psychological and pedagogical. They influence the self-regulation of the learners. Extensive educational concepts in which environments of psychological point of view and physical arguments are included in the classroom learning environment and teachers' qualities and attitude produce any educational elements and social goals towards

classroom learning environment (Fraser, 2007). Self-regulation has a deep link with the classroom learning environment (Barak, Hussein-Farraj, & Dori, 2016) and learner's performance (Wang, & Zhan, 2020). It is individual's ability for controlling actions and task to get particular target. The inner environment of the classroom is attached to the sentiments, findings, observations and results of experiences conducted for students (Fraser, 2009). A positive CLE creates a sense of fulfillment and unfulfillment, pleasure and fraught of horror towards a specific subject. In this way the students positive understanding regarding classroom environment helps to get the good results and outcomes from them (Wang, & Zhan, 2020).

Retention of concepts for transfer of knowledge while moving one topic to another is the most necessary factor for learners in today's classroom. It helps the teacher for reviewing and re-teaching concepts; thus, retention comes at top priority at the classroom level. The word retention has also been linked with student's enrollment during fall to fall in a class or a subject. Todays in our classrooms Math is being taught as a compulsory subject all over the world. To create educated individuals who can apply mathematics in everyday life; mathematical studies were designed. It develops decision making skills in people and solve effective problem. The findings of various researches (Reynolds & Walberg 1992, Mata, Monteiro, & Peixoto, 2012) regarding retention in mathematics revealed linkage between students positive thinking for classroom learning environment have an important function.

According to Fraser (2002) some necessary dimensions are useful for the promotion of an ideal environment of classroom like teacher guidance, partnership, cooperation, student motivation, equality and hearing. Retention of students in mathematics is positively associated with classroom learning environment (Edwards, Rule, & Boody, 2017). Student's affective outcomes have strong impact by classroom learning environment (Fraser, 2002). Kim, et al., (2000) believed that males need focused classrooms as compare to females. The relationship of student and teacher is significantly dependable on learners' self- regulation and retention in Mathematics. Researches clearly show that the gender were not significantly different for different levels of learning environment while it was concluded that the retention of female in Math was very positive and affirmatively encouraging than males for classroom learning environment. Moreover, the teachers must try hard for understanding interests of learners with respect to learning and providing the solutions of their problems in the process of their learning. Similarly, in several studies locale wise differences were also

found. In many researches it is observed that self-regulation of learners from rural areas were more positive than the urban students regarding classroom learning environment. The tool WIHIC was adopted for measuring learning environment which was developed by Fraser (2007). For student's self-regulation "Academic Self-Regulation" tool was adopted that is developed by Zimmerman and "Retention in Math" scale was used for the assessment of students learning in classroom.

Self-regulation and retention in Math have been key components of classroom learning environment. Its detailed perceptive is very essential to enhance student's achievements and success but these aspects were being neglected badly in Pakistan. Thus, in this study the relationship between CLE, SR and Retention in Mathematics was determined through following objectives.

Objectives

1. To examine the nature of CLE, SR and Retention in Math.
2. To explore the relationship between CLE, SR and Retention in Math.

Research Questions

1. What is the nature of CLE, SR and Retention in Math?
2. Is there any difference between boys and girls scores on CLE, SR and Retention in Math?
3. Is there any relationship between CLE and students' SR at gender level?
4. Is there any relationship between CLE and students' Retention in Math at gender basis?

Methods

It was quantitative approach based on survey method, which was conducted on 10^{th} graders of public secondary schools of Punjab. It is crucial stage as at this level achievements decides the future of the students. Out of 36 districts, two districts were selected conveniently, from each district forty secondary schools (20 girls & 20 boys' schools) were randomly selected.

Instruments

It was survey study in which three questionnaires were used for data collection. What is Happening in the Classroom (WIHIC) scale (Fraser, 2007) adapted by Islam (2012) was used to measure CLE and

for measuring SR tool developed by (used by Akhter, 2012 & Monza Batool, 2016 in local context) was used and "Retention in Math" scale, developed by researchers themselves was used for data collection. For CLE scale, the reliability coefficient was 0.91, for self-regulation scale it was 0.83 and for retention in Math; it was 0.84 for the whole scale which discovered that the tools were reliable for the study. The validity of these tools in context of Pakistan had already been established in the past researches.

Pilot Testing of Retention in Math instrument

Two hundred (100 boys and 100 girls) students were selected for pilot testing of retention in math scale. Initially reliability of the scale (with 20 items) was calculated as 0.81. While collecting the data for the pilot study, the researchers found that participants were feeling difficulties in understanding a few questions. With the help of bilingual experts, necessary amendments were induced with reference to understanding level of the students. By rephrasing items, the tool was once again administered to 200 students. Its reliability was increased from 0.816 to 0.842. Total 16 items were finalized as questionnaire.

Procedures

The researchers ensured data collection in person from all the forty schools from two districts after taking permission from principals of the concerned schools. Questionnaires were personally administered by the researchers in the classrooms. After introduction researchers briefed the participants about the study. Data collection process took approximately two months.

Data analysis

The scorning was made and entered in SPSS software for its analysis. Along with mean and standard deviations, variables were compared through t test. In order to establish relationship between the variables, Pearson correlation was used.

Results of the Study

Table 1

Mean and SD of Retention in Math, SR and CLE Scales

Variable	N	Mean	SD
Retention in Math	997	61.54	8.811
Self-Regulation	997	112.37	13.811
Learning Environment	997	223.68	24.230

The above table showed that the mean of Retention in Math for the whole sample is (61.54) with standard deviation 8.811, mean of SR (112.37) with standard deviation 13.811 and mean of CLE (223.68) with standard deviation 24.230.

Table 2

Comparison of SR, Retention in Math and CLE on gender basis

Variables	Gender	N	Mean	SD	Df	t	p
Self-regulation	Male	489	111.45	14.004	995	-2.068	.039*
	Female	508	113.26	13.577			
Retention in Math	Male	489	61.84	8.086	995	1.047	.995
	Female	508	61.25	9.456			
Classroom learning Environment	Male	489	223.78	22.703	995	0.133	0.894
	Female	508	223.57	25.637			

*p>0.05

The above table reflects that difference in mean of Male (Mean = 111.45, SD = 14.004) and female respondents (Mean = 113.26, SD = 13.577) was not significant for SR at p>0.05 with the t value (- 2.068) and df (995). It can be inferred that female students had similar self-regulation when compared with male students.

Table 2 also reflects that difference in Mean of Male (Mean = 61.84, SD = 8.086) and female respondents (Mean = 61.25, SD = 9.456) was not significant at p> 0.05 with the t value (1.047) and df (995). It can be concluded that male students had similar retention in Math with respect to female students.

Table 2 further explains that mean difference was not significant at p>0.05 with t-value 0.133 and df 995 for boys and girls which reveal that male students (M= 223.78, SD= 22.703) and female students (M= 223.57, SD= 25.637) on WIHIC scale. Boys had similar perception regarding CLE with respect to girls.

Table 3
Relationship between SR and CLE

Respondents	Gender	N	r	p
Overall		997	0.052	0.103
	Male	489	0.041	0.366
	Female	508	0.062	0.163

p>0.01

Analysis shows that there exists no significant relationship between CLE and SR of students' (r = 0.052, p>0.01). The relationship of CLE and SR of students for Male (r = 0.041) as well as for Female (r =0.062) respondents was not significant.

Table 4
Relationship of CLE and Students Retention in Math

Respondents	Gender	N	r	p
Overall		997	0.044	0.165
	Female	508	0.100	0.025
	Male	489	0.033	0.471

p>0.01

Table 4 reveals that there is no significant relationship between CLE and students' retention in Math with (r = 0.044). Female (r = 0.100) respondents show significant relationship as compared to male (r = 0.033) respondents.

Discussion

It was concluded that female and male students had similar SR which is in contradiction with the findings of Bembenutty (2007). These findings indicate that the females had more self-regulation as they always focus on self-organization and do rehearsal through self-regulation strategies as compared to males. It is more common in the society which is also depicted from figures and digits that the girls display better and apply more strategies for self-regulation than boys. The females are more disciplined and have better ability than males for regulation (Duckworth, Seligman, 2006). The elements of instruction and teachers' attitude are main factors which influence the student's self-regulation in classroom. It includes practicality, teachers' spirit, humor, clearness and teacher hope for students' capacity that leads quality teaching.

Boys and girls quite differ in all fields but in this study, they were same in most of the findings. Quite same case found with the perceptions of males and females regarding classroom learning environment. It was concluded that female and male students had similar CLE that was in contradiction with previous findings which consistently indicated that in geography and mathematics female respondents had more concern for learning environment with respect to males (Aldridge & Fraser 2000). According to Boekerets and Cascullar (2006) the perception of the learners regarding their CLE have relationship with their thoughts for completing the process of learning activities in classrooms. Analysis shows that there exists no significance relationship between CLE and SR of students for the whole sample and moreover it was also not significant on gender level. which was contradictory to past researches. According to Goh and Fraser (2003) the girls identify more suitable classroom environments than boys although the boys have credit of mathematics achievements.

For the whole sample no significant relationship between CLE and students' retention in Math was found but it was significant for females as compared to males. It is another affect that the females had more useful retention in math than boys. This outcome is similar to the past research which reveals that the female students perform better in the teaching of mathematics in comparison to male in the learning environment (Arnot et al., 1999; Hydea et al., 2009). These were in contradiction with the results of past researches which described that boys shows more retention in mathematics with respect to girls (Fennema,2000; Ajai & Imoko, 2015).

Recommendations

As outcomes of this research, following recommendations were given for making classroom learning environment conducive for learners. For this purpose, the teacher personality should have some qualities and abilities to make better arrangements for the class and entrust responsibilities to learners. The learning environment should be interactive by using activities in the class. Psycho-social environment and Physical learning is being neglected in a Pakistan's national educational policies so, the policy makers should keep in mind these two important aspects to improve the student's retention in Math.

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