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Determination of the Problems Confronted by Secondary School Teachers in Creating Higher Order Thinking Skills of the Students

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ABSTRACT

Higher order critical thinking skills stimulate the cognitive abilities of students which evolve through teaching-learning process. The purpose of this research was to explore problems faced by mathematics teachers for the development of higher order thinking skills of students. Population of the study consists of the public secondary school mathematics teachers in district Kasur. The selection of the participants was made through simple random sampling technique and 187 (Male 89 & Female 98) teachers were selected from different sample school. A five-points Likert Scale questionnaire was used for data collection through survey method. The findings revealed that there was a significant difference between the gender of the respondents about instructional skills and students' attitude. Moreover, there was significant difference found among professional experience of the respondents about incompatible curriculum. Furthermore, there was no significant difference found among the academic qualification of the teachers. The study is beneficial for the educationists in order to adopt the new strategies for the development of higher order critical thinking skills among the students.

***Keywords*:** Teachers' Problems, Higher Order Critical Thinking Skills, Secondary School Students

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INTRODUCTION

Mathematics is compulsory among all the subjects that are taught in all primary and secondary schools in Pakistan. In this subject, students make their enthusiastic efforts to clarify their concepts for getting better grades. At grass root level, the mathematics is considered as a major subject for the enhancement of ability for future outcomes. The framework of this subject targets the various attitudes and mind set of the learners (Parveen et al., 2021). Unfortunately, the teachers of mathematics subject at secondary and higher secondary schools seem to be unsuccessful to produce critical thinking skills in the minds of students. The majority of students often complaint to feel difficulties in mathematics and as a result they cannot get the maximum marks for success (Ibrahim et al., 2019). The teachers make their useful efforts to

share their experience according to the rules of the mathematics given in the textbook so that the students feel easy and take interest for the better achievements (Fareed et al., 2018). They further posited that focusing on the rules and concept is not the appropriate way for learning the mathematics. The students learn the rules but not focus on the basic concepts of this subject. It is impossible for the students to overcome the problems without learning the fundamental concepts. In 21st century, like the massive development in other organizations, the education sector is also trying to uplift the teaching learning process (Wilson & Narasuman, 2020). From last couple of decades, the development of higher order critical thinking among the students has become a challenge for the educationist, policy makers, and curricular developers. The success of the students is considered as the real development of the education institutions. In order to achieve this objective a number of approaches have been adopted for the professional training of the teachers. It is only possible when teachers will strive to create high order critical thinking in students (Ali et al., 2021).

In modern era, the teachers having professional abilities focus on the real objective of the educational institution as the development of students' thinking abilities. Teaching learning process can be effective if the students have a keen desire to learn concepts. Teachers' motivation is an important element to develop the higher order thinking skills in students. Despite of all the efforts by the teachers, there are some obstacles for teaching mathematics at secondary school students i.e., in setting standards, harnessing students' potentials and avoiding focus on the cramming and copping (Jacobs, Lamb & Philipp, 2010). Malik et al (2016) knowledge sharing behavior among the students play fundamental role for creating HOTS. During these activities, students share their ideas, feelings and skills which are most beneficial for the development of thinking skills. The positive interaction between teachers and students also plays a vital role for this concern. Therefore, teacher student cooperation helps students to utilize their thinking skills for better learning in mathematics. To develop high order thinking skills among students, require different kinds of activities as: formative assessment, corrective feedback, group problem solving, creativity, and project-based learning. Analytical and logical activities enhance the high order thinking skills of students in the subject of mathematics (Doganay & Bal, 2010).

Higher order thinking skills are difficult to produce among students for a number of reasons at public schools for example, having large size of classes, extra workload, teacher's limited knowledge regarding HOTS, lack of motivation on the part of students and teachers, lack of cooperation between teachers and students, deficient and restricted curriculum and ineffective examination system (Nitsch, Fredebohm, Brider, Kelava, 2013). Lack of interest of students in Mathematics is a major gap for creating HOTS. Students feel fear and psychological pressure about the subject of mathematics. This gap can be filled with the mutual positive relationship between students and teachers. Teachers' lack of knowledge about the subject contents, characteristics of higher order thinking skills and lack of pedagogical abilities are also a barrier in the way of ineffective growth of the thinking abilities of students. There is a need to focus on the concepts and logic of mathematics rather than cramming the formulas and results of the questions (Amirali & Halai, 2010). Moreover, there are some problems in the process of curriculum development of mathematics. The standards of mathematics are not set and do not meet the challenges of modern age. The curriculum does not meet the mental level of students. It is a natural phenomenon that there is hell of difference between mathematics and the other secondary school subjects. Other subjects relate to the social values and interaction whereas mathematics is totally different and needs isolated contemplation. The mathematical subject is based on problem solving, logic, analysis and synthesis. So, it is necessary to enhance critical thinking among students for the better achievements in academic activities (Maloney & Confrey, 2010).

LITERATURE REVIEW

Previous researches emphasize that higher order thinking skills are important part of the knowledge which helps students for the completion of their academic objectives. Higher order thinking skill's paly vital role for making the deductive and inductive formulas. Curriculum is the special tool for the completion of teaching process. Without content material and instructions in curriculum effective teaching is not possible (Ali et al., 2018). Due to these fruitful instructions, teacher is able to make his teaching effective. If the curriculum is developed on the basis of standards and innovation then it plays vital role to meet the new challenges according to the requirement of the subject (Al-Enezi, Farahan, 2008). From the last couple of decades, the national council of teachers in mathematics has made major reforms in curriculum development. It emphasized on the content matter, set the standards in the subject of mathematics at secondary level and the teaching strategies (Ibrahim et al., 2019). This council further suggested that the curriculum should have the effective instruction for good teaching according to new strategies. The teachers carefully examine the sense of students and give them instructions according to the course strategies. Teachers encounter the students' quires and suggest them various constructive tasks for creating HOTS so that they can solve the logical issues. The instructional strategies with the course content have their significant contribution to create HOTS of the secondary school students in subject prospective (Confrey et al., 2012).

Instructional skills are the practices that the successful teacher continually illustrates during teaching. Collaboration with students in different curriculum activities, and practicing exercises through creative learning strategies and techniques to provide the subject matter information leads to HOTS. These refer to students' character and capability, for problem solving through higher order thinking skills (Bielaczyc, 2013). Moreover, the instructions just to encourage the students how to learn the logical sense, yet it is a preparation to build up the characteristic and possibilities and to make them more skillful on the base of utilization of energies, time and assets. The students' HOTS depend on the teachers' effective instructions. Due to instructional skills the teachers overcome all the issue created during class activities i.e., work load, large number of classes (English, & Kirshner, 2016).

Abstractly, discipline is a guideline and specific procedure to make the teaching learning process effective. In education classroom discipline means to manage the class for the completion of common objectives of students and teachers and change the attitudes and behavior of students accordingly. It is further stated that to maintain the discipline is to help students to adjust themselves with social interaction for learning (Drijvers, & Trouche, 2008). Government of Pakistan (2010) posited that to fulfill the educational objectives successfully, it is necessary to ensure a good discipline during classroom activities. Due to good discipline, students learn about the social value and ethics that are not only beneficial for obtaining the grades but are also helpful to prepare themselves for problem solving. Without good discipline, it is impossible to develop the higher order thinking skills among students. No doubt, teachers and students have thinking sense to learn new knowledge. They are also critical to the successful implementation of reforms at the school level. Therefore, the success is pinning up by positive correlation between students and teacher (English, & Kirshner, 2016).

The instructions and guidelines of teachers for the students play a vital role for the development of logical and analytical abilities. The researchers believes that the transformational teaching style of teachers enhance the learning abilities of the students (Chamosa et, al., 2012). For creating students' HOTS in mathematics is a major contest in modern era. Instructional environment during classroom activities is stepping stone for this concern. Teachers adopt

various approaches to create favorable environment for effective learning and give positive instruction to students for problem solving (Purnomo, 2017). The project-based assessment is an important tool among all the factors related to enhancement of HOTS of students in mathematics. Unfortunately, these activities are very rare to see at secondary level. Project based learning emphasize students to solve their problems through involvement of higher order thinking skills for the completion of tasks (Furtak, 2009; Ruthven, 2014).

RESEARCH QUESTIONS

1. Is there any significance difference between male and female secondary school mathematics teachers regarding problems faced in developing higher order critical thinking skills of the students?
2. Is there any significant difference among the academic qualification of secondary school mathematics teachers about problems faced in developing higher order critical thinking skills of the students?
3. Is there any significant difference among the professional experience of secondary school mathematics teachers about problems faced in developing higher order critical thinking skills of the students?

METHODOLOGY

The study has been conducted in quantitative research paradigm. It focuses on problems faced by mathematics teachers for creating higher order thinking skills of students in district Kasur. The population of the study was the mathematic secondary school teachers from district Kasur. For sample, 200 mathematics teachers were selected for data collection. Simple random sampling approach was adopted to select the sample of the study. The self-administered questionnaire was used based on the related literature included in this study. The dimensions including in questionnaire were; incompatible curriculum, instructional skills, students' attitude, instructional environment and examination system. The data was collected by using self-administered questionnaire through survey method. The reliability and validity of the questionnaire was also ensured. SPSS was used to analyze the research questions through descriptive and inferential statistics.

FINDINGS

Table-1. Descriptive Analysis of factors about problems faces by teachers related to develop the high order critical thinking in mathematics

Factors	M	SD
Incompatible Curriculum	3.91	.75
Instructional skills	3.78	.87
Students' attitude	3.67	.86
Instructional environment	4.07	.74
Examination system	3.68	.91

Overall Mean= (M= 3.82, SD= .71)

Mean of the statements about problem faced by mathematics teachers for the development of students' HOCT skills. The mean score of the statements is ranging from M= 3.67 to 4.07 and SD= .74 to .91 and overall M= 3.82, SD= .71.

Table-2. Independent Sample t-test

Factors	Gender	M	SD	t	Sig.
Incompatible curriculum	Female	3.92	.80	.16	.86
	Male	3.90	.69		
Instructional skills	Female	3.63	.90	-2.68	.00*
	Male	3.97	.80		
Students' attitude	Female	3.55	.87	-2.01	.04*
	Male	3.80	.82		
Instructional environment	Female	4.05	.77	-.57	.56
	Male	4.11	.71		
Examination system	Female	3.58	.93	-1.65	.09
	Male	3.80	.87		

Significance level <.05

To determine the significance difference between the gender of secondary school teachers in order to develop the higher order thinking, t-test was conducted. There was no significant statistical difference in mean score of male and female teachers about problems related to curriculum for males (M= 3.90, SD= .69) and females (M= 3.92, SD= .80), t = .16, p =.86 > .05. There was a significance difference in instructional skills because males scored greater (M= 3.97, SD= .80) than females with (M= 3.63, SD= .90), t = -2.68, p =.00< .00. There was a significant gender difference about students' attitude because males' score was greater (M= 3.80, SD= .82) than females (M= 3.55, SD= .87), t = -2.01, p =.04< .05. There was a significant statistical difference in male and female teachers for the problems of instructional environment because males scored higher with (M= 4.11, SD= .71) and females scored with (M= 4.05, SD= .77), t = -.57, p =.56 > .05. There is no significant difference in the mean score of male and female teachers about the problems of system of examination as males score (M= 3.80, SD= .87) and females scored (M= 3.58, SD= .93), t = -1.65, p =.09 > .05.

Table-3. Analysis of variance

Factors		SSq	df	M Sq	F	Sig.
Incompatible Curriculum	Between Groups	4.83	3	1.610	2.880	.03*
	Within Groups	105.67	189	.559		
	Total	110.50	192			
Instructional skills	Between Groups	3.48	3	1.163	1.532	.20
	Within Groups	143.47	189	.759		
	Total	146.96	192			
Students' attitude	Between Groups	3.74	3	1.247	1.699	.16
	Within Groups	138.66	189	.734		
	Total	142.40	192			
Instructional environment	Between Groups	2.75	3	.918	1.672	.17
	Within Groups	103.80	189	.549		
	Total	106.56	192			
System of examination	Between Groups	2.83	3	.944	1.140	.33
	Within Groups	156.48	189	.828		
	Total	159.31	192			

*Significance level **<.02, *<.05*

To investigate the significant difference among the professional experience of the teachers, ANOVA was conducted among these groups (Group 1: 1-10 years, Group 2: 11-20 years,

Group 3: 21-30 years, Group 4: more than 30 years). A significant difference was found at ∞=.05 level in curriculum. Scores for the experience groups: F (3, 189) = 2.88, P=.03. Due to not reaching statistical significance in other factors, the actual difference in mean scores among the groups was quite small except curriculum.

Table 4. *Analysis of variance*

Factors		**SSq**	**df**	**M Sq**	**F**	**Sig.**
Curriculum	Between Groups	2.21	2	1.107	1.943	.14
	Within Groups	108.29	190	.570		
	Total	110.50	192			
Instructional skills	Between Groups	2.92	2	1.462	1.929	.14
	Within Groups	144.04	190	.758		
	Total	146.96	192			
Students' attitude	Between Groups	2.53	2	1.265	1.719	.18
	Within Groups	139.87	190	.736		
	Total	142.40	192			
Instructional environment	Between Groups	2.31	2	1.158	2.111	.12
	Within Groups	104.24	190	.549		
	Total	106.56	192			
System of examination	Between Groups	1.71	2	.858	1.035	.35
	Within Groups	157.59	190	.829		
	Total	159.31	192			

*Significance level **<.02, *<.05*

To investigate the significant difference among the academic qualification of the teachers, ANOVA was conducted among these groups (Group 1: Graduation, Group 2: Master, Group 3: M. Phil). There is no significant difference found in the three groups with F (2, 190) = 1.943 at p=.14>.05. Due to not reaching statistical significance in any factors, the actual difference in mean scores among the groups was quite small.

CONCLUSIONS and DISCUSSION

On the base of the findings, it concluded that there was a significant difference between the gender of the respondents about instructional skills and students' attitude the dimensions of problem faced by secondary teachers. Moreover, there was significant difference found among professional experience of the respondents about incompatible curriculum. Furthermore, there was no significant difference found among the academic qualification of the teachers.

To develop the higher order thinking skills among the secondary school students has become need of the hour in modern era especially in Mathematics subject. The teachers play a vital role for this concern. The students get maximum grades in Mathematics and can be able to utilize this skill in real life with more productivity, when they have higher order critical thinking. The study may prove as a stepping stone for the staff development to enhance the instructional skills among the teachers during teacher training programs.

The mathematics subject should be based on the analytical and logical activities so that it can enhance the higher order critical thinking of students. Staff development should be focused on the teachers' instructional skills towards the students' HOD skills especially in Mathematics subjects. The teachers and parents should keep in touch to make the better attitude of the students towards the development of higher order critical thinking skills. The behavior of the

teachers towards the students should be democratic so that students can enhance their higher order thinking with the help of teachers' instructional behavior.

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