Conceptual Level of the Prospective Teachers About Critical Thinking and Problem-Solving Skills

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Abstract---- Critical thinking and problem-solving skills are thinking skills that require a cognitive process. Teachers are assumed to learn about these skills and how they can be promoted in their learning methods. The present study was conducted to explore the conceptual level of critical thinking and problem-solving skills of the prospective teachers in district Lahore. This study was qualitative in nature. Fifty prospective teachers at the university level were purposively selected who were willing to participate in the study. Two open-ended questionnaires (Questionnaires for Critical Thinking and Problem-Solving Skills of Prospective Teachers) were used in this study. These instruments were developed by the researchers themselves after reviewing of the literature. The instruments were validated by three experts to ensure the measurement level of critical thinking and problem-solving skills. The open-ended questionnaires were administered among the sample of prospective teachers of selected universities. Data analysis is represented in form of charts and word clouds with the help of NVivo 12. Responses of the participants were coded and then generate the themes, organizing categories and themes according to questions and then create charts and word clouds with the help of NVivo.
Findings of the qualitative responses indicated that the awareness level of prospective teachers regarding to knowledge of problem-solving skills (85%) was better than the knowledge of critical thinking (26%). It was recommended that the curriculum planner have to need to revise the teaching training syllabus with regard to critical thinking and problem-solving skills to develop effective teachers for the future.

Index terms--- Critical Thinking, Problem Solving Skills, and Prospective Teachers.

1 INTRODUCTION

It is common knowledge that in our modern life data plays a critical role. In all human activities, data has taken the top output role. Each of us needs to read and reflect about what we've learned, not just what we've heard, but what we've understood as well. Richard and Rogers (2000) claimed that cognitive discipline and intellectual development were correlated with learning.

Critical thinking as one of the factors influencing the learning process is a human cognitive capacity that affects the thinking process. In our lives, it has a powerful effect. There is no end in furnishing sense of Thought or critical thinking, much less in defining its universally acceptable concept (Pajoumnia, 2017).

According to Paul (1990), critical thinking is that way of thinking about any topic, substance or question in which the thinker improves the quality of his or her thought by skillfully taking over the mechanisms inherent in thinking to claims and arguments. Halpern (1996) argues that critical thinking is the use of cognitive abilities or techniques that increase the likelihood of desirable outcomes. He also adds that a purposeful, rational, and goal-oriented critical thinking. It is the kind of thinking involved in problem solving, inferences formulation, probability estimation and decision making.

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Howie (2011) emphasized that one of the highest levels of mental activity is the ability to think critically. This empowers people to engage in decision-making and job organization processes (Alazzi & Khawaldeh, 2008). In order to meet business demands and solve social and current day-to-day challenges, it is important to develop cognitive skills for learners to help them succeed in different fields in their upcoming life plans. Gaining the ability to think critically can help learners develop their thoughts and ideas rather than simply repeating and pursuing others ' ideas by enabling their cognitive ability to evaluate different perspectives and points of view. As suggested by Alwadai (2014), a crucial reason for improving the mental skills of learners through the school context is to further improve the mental growth of learners by giving them realistic opportunities that might challenge their thinking processes. Therefore, teaching learners to think critically and drive them to activate their higher thinking skills is the task of the instructor.

Constructivists agree that curriculum designers should provide a situation in which learners think critically in the classroom through reasoning debates that stimulate and promote discussion and evaluation. However, emphasis on the development of reasoning skills and demand for inclusion of reasoning education in the curriculum as a fourth component of basic education after reading, writing and counting are indicative of increased commitment to critical thought. It is therefore important for all people to learn critical skills. So they can enhance their power of thought and create effective communication with others. Some experts believe that problem solving is a critical thinking sub-category, while others claim that these two definitions overlap. In reality, problem solving is a creative and behavioral-cognitive method that offers effective strategies for routine issues. Therefore, problem solving is an important strategy for coping that improves personal ability and reduces stress. Critical thinking and problem solving are therefore important skills that should be taken into account in any educational system (Maryam, Zeinab & Asharf, 2018).

The interpretations of critical thinking that originated from the cognitive psychological approach include the following: the mental processes, techniques, and perceptions that people use to solve problems, make decisions, and learn new concepts can be considered. It can also be defined as the use of certain cognitive skills or techniques that increase the likelihood of a desired result. In the theory of critical thinking, Facione identified six cognitive abilities as essential. Such competencies include interpretation, evaluation, description, assessment, self-regulation, and inference. Therefore, critical thinking skills are skills that help one to evaluate and synthesize information in order to solve issues in a wide range of areas (Alcanatara & Bacsa, 2017).

Critical thinking is an integral part of research, creativity and problem-solving (Alatas, 2014). Critical thinking allows individuals to effectively solve the problem and be able to observe it from a different perspective. As a result, more alternative solutions can be sought for an issue for students with sound critical thinking. Therefore, critical thinking in the problem-solving process is essential for students (Irma, Parno & Susriyati, 2017).

Problem solving is concerned with thinking processes that reveal individuals' point of view when a problem occurs. In this case, problem solving can be explained by the cognitive strategies determined by individuals. At the same time, these cognitive strategies can be applied to other situations after learning them. Individuals' thoughts, feelings and behaviors related to individual problems in everyday life are related to problem-solving skills (Cansoy & Turkoglu, 2017).

In describing the student thinking process, this research uses the template (Haller. C, Fisher. R. & Gapp. R, 2007) which is the primary focus in the context of learning and teaching. The model indicates that learners engage in the learning process through repetitive operations, memorization, comprehension, and reflection. All of these procedures involve them to think about how to achieve efficient learning results and thus improve problem-solving skills.

1.1 Statement of the Problem

This research was conducted to explore the conceptual level about critical thinking and problem-solving skills of the prospective teachers. Teachers have a very important role in promoting the learning process and the individual abilities of their learners. The way of their learners thinking abilities to solve problems may be significantly reinforced by the teachers. The ignorance of knowledge of teaching strategies for the growth of critical thinking and problem-solving abilities in potential educators may limit their capacity to support the learning process.

1.2 Objectives of the Study

The following objectives guided the study:

1. Explore the conceptual level of critical thinking in prospective teachers.
2. Explore the conceptual level of problem-solving skills in prospective teachers.

1.3 Research Questions

Consistent with the objectives, the study was driven by following two research questions:

1. What is the conceptual level of prospective teachers about critical thinking?
2. What is the conceptual level of prospective teachers about problem-solving skills?

1.4 Delimitations

Due to limited time and other resources, the current study was delimited to:

1. The prospective teachers of public and private universities in district Lahore.

2 Methodology

This study was qualitative in nature. The data was obtained through open ended questions from prospective teachers. The purpose of this study was to explore the conceptual level about critical thinking and problem-solving skills of the prospective teachers in district Lahore.

2.1 Population

Population of this study comprised of two universities (1 public and 1 private) prospective teachers of district Lahore.

2.2 Sample Selection

Purposive sampling technique was used to select the sample i.e., only the prospective teachers who were willing to participate in the study constituted the study sample. Eighty participants were contacted directly by the researcher, out of 60 showed willingness to participate in the study. Four males and six females' prospective teachers withdrew their participate in the study; hence the final sample consisted of fifty prospective teachers (20 males and 30 females).

2.3 Instrumentation

Two questionnaires (assess critical thinking and assess problem solving skills of prospective teachers) were used in this study. The instruments were developed to explore the conceptual level about critical thinking and problem-solving skills of prospective teachers. The open-ended questions of both instruments were developed by the researchers themselves. The reliability was investigated of both questionnaires using Cronbach Alpha which was 0.87.

2.4 Data Collection Procedure

The questionnaires were administered among the sample of prospective teachers of selected universities. Respondents were requested to completely fill out the questionnaires. Data were collected in accordance with the levels of both questionnaires.

2.5 Data Analysis

Qualitative data was analyzed through NVivo 12 software. Data analysis is represented in form of charts and word clouds with the help of NVivo. Responses of the participants were coded and then generate the themes, organizing categories and themes according to questions and then create charts and word clouds with the help of NVivo.

3 Findings

Two research questions were addressed in the literature review and their findings are given below:

1. What is the conceptual level of prospective teachers about critical thinking?

For this research question, the qualitative responses, about the conceptual level of critical thinking from the prospective teachers were obtained. The analysis of qualitative data reflected

different themes which are mainly categorized into different themes. The first perspective is referred as “Understanding ability of prospective teachers about critical thinking”. Whereas the second is called as “Use of critical thinking in classroom to make effective lessons” and third is “Thinking skills strategies to develop critical thinking in learner”. The perspectives and resulted themes are presented in figure.

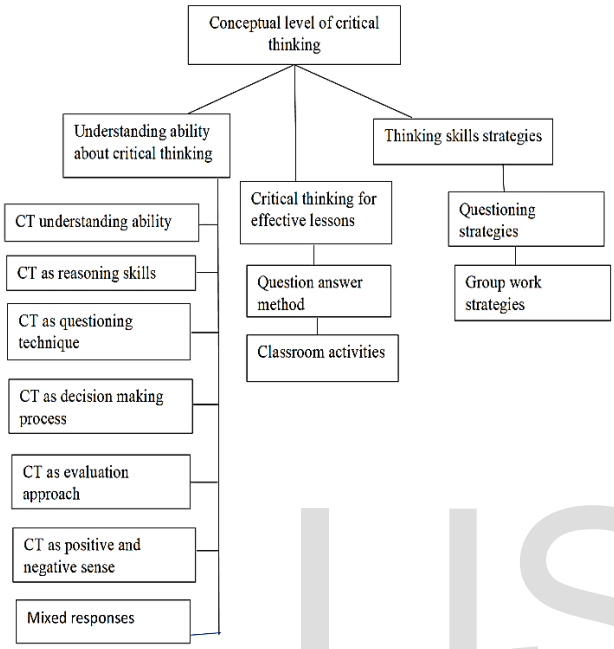
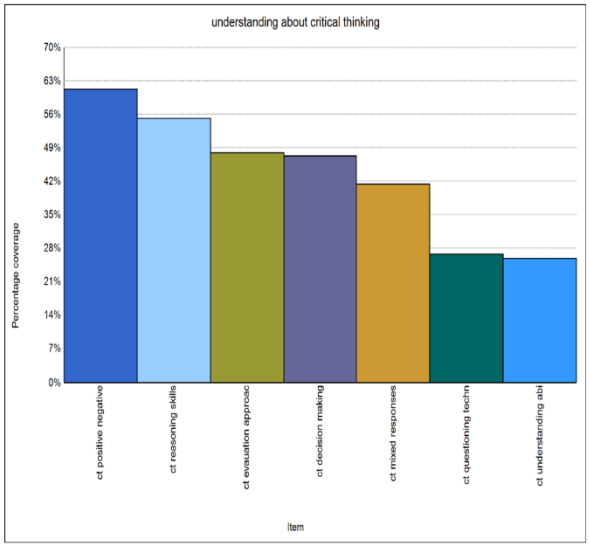


Chart 1.

Prospective Teachers' Understanding about Critical Thinking



The qualitative responses in chart 1 indicate that prospective teachers mentioned critical thinking mostly in positive and negative sense; as reasoning skills, evaluation approach, decision making, questioning techniques, understanding ability and few give mixed responses about critical thinking, presented in word cloud figure 1. Chart 1 indicated that 62% prospective teachers perceived critical thinking in negative and positive sense and only 26% prospective teachers indicate critical thinking as understanding ability. These results indicate that mostly prospective teachers understanding level about critical thinking is not clear.

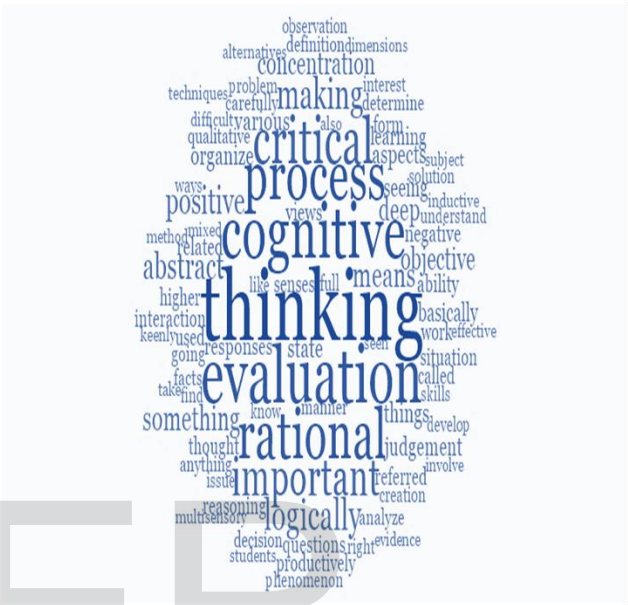
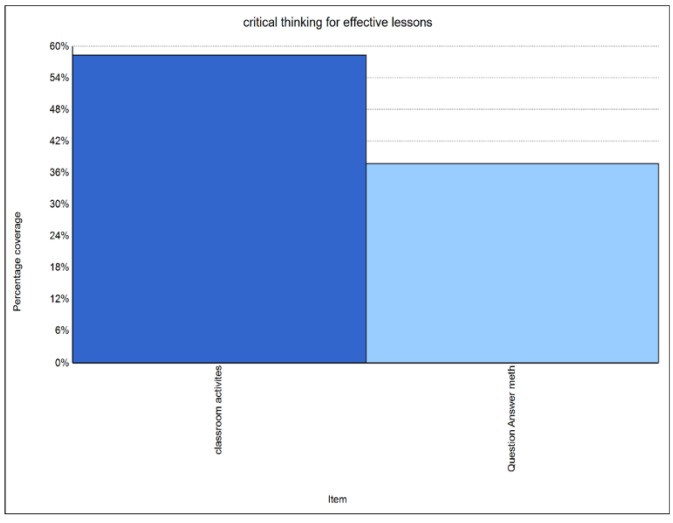


Figure 1. Word Cloud Presentation About Understanding Level Of Prospective Teachers

Chart 2.

Critical Thinking for Effective Lesson



The qualitative responses in chart 2 indicate that mostly prospective teachers to make their lessons effective use critical thinking in their classroom activities as discussion method, games, quiz and assignments and other use critical thinking as question answer method as presented in figure 2. Chart 2 indicate

that 58% prospective teachers preferred classroom activities and 36% prospective teachers preferred question answer method for making effective lessons by using critical thinking.

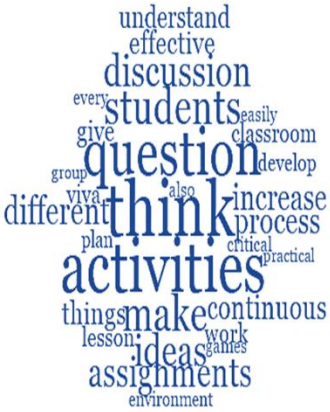
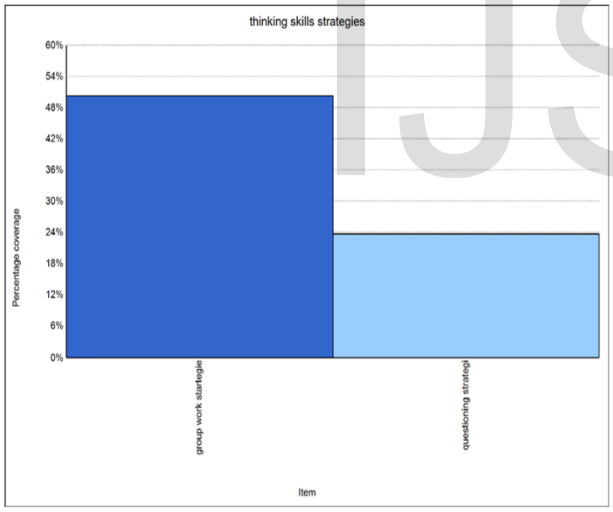


Figure 2. Word Cloud Presentation About Critical Thinking For Effective Lesson

Chart 3.

Thinking Skills Strategies



In chart 3 qualitative responses of prospective teachers refer questioning strategies and group work strategies to develop critical thinking in learner. Questioning strategy roots to historical perspective of critical thinking, it is a Socratic method to ask questions in classroom to develop critical thinking. It is basic strategy to develop critical thinking in learner. Group discussion and collaborative learning refer by prospective teachers to develop critical thinking skills in learner, these skills play vital role in critical thinking represent in figure 3. Chart 3 indicated that 50% prospective teachers refer group work strategies and 24% refer questioning strategies.

Figure 3. Word Cloud Presentation About Thinking Skills Strategies

2. What is the level of problem-solving skills in prospective teachers?

For this research question, qualitative responses, which are conceptual level of prospective teachers about problem solving skills, are examine by using qualitative methods. The analysis of qualitative data reflected different themes which are mainly categorized into different themes. The first perspective is referred as “Understanding about problem solving skills”. Whereas the second is called as “importance of critical thinking for problem solving skills” and third is “problem solving skills strategies”. The perspectives and resulted themes are presented in figure.

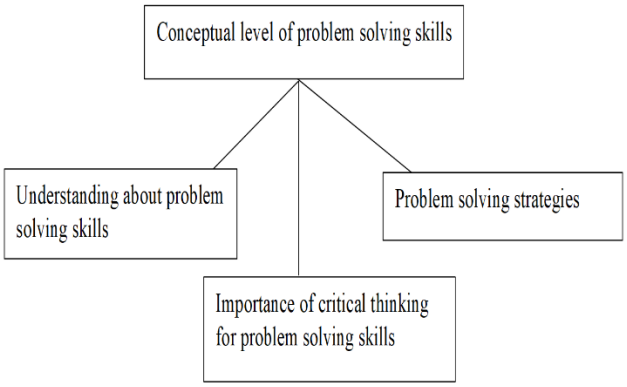
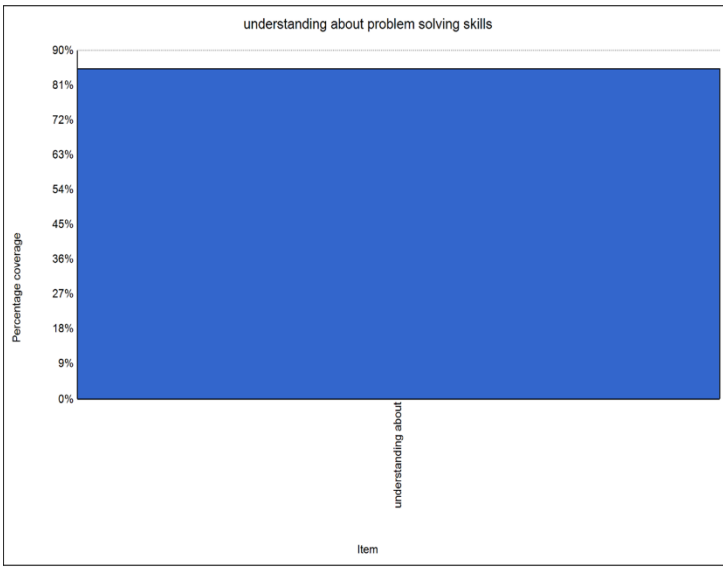


Chart 4.

Understanding About Problem Solving Skills



In chart 4 responses, indicate that 85% prospective teachers describe problem solving skills as mixed/ general responses: independent them, analyze, scientific methods, making hypothesis, judge the problems and to focus as present in figure 4. Results show that prospective teachers refer problem solving skills with different perspectives, the main activity to solve the problems is dominant in their definitive phrases.

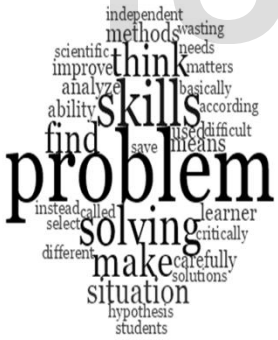
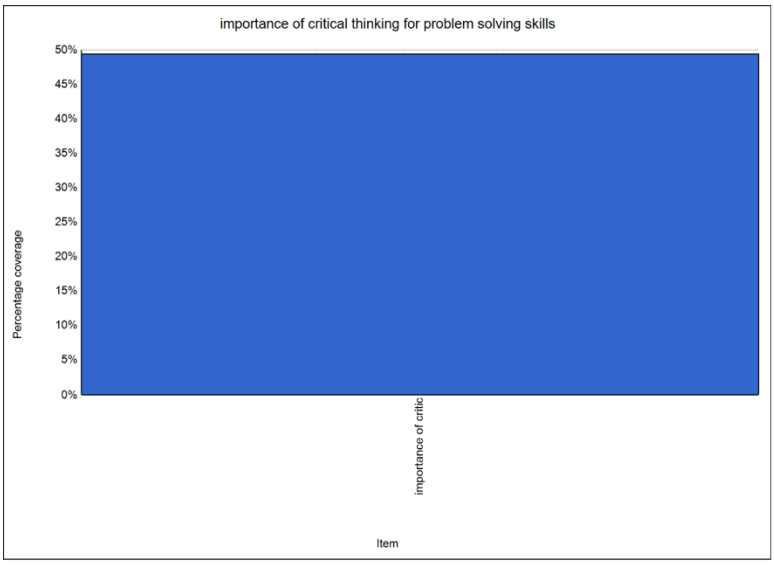


Figure 4. Word Cloud Presentation of Understanding About Problem Solving Skills Of Prospective Teachers

Chart 5.

Importance of Critical Thinking for Problem Solving Skills



In chart 5 response, indicate that 49% prospective teachers' response yes critical thinking is important for problem solving skills and they give different reasons to support their arguments. Results show that they give different reasons which are described as follows: to get more information, reasons about problems, give understanding about matters, surety for one answer and broader mind to solve problems as present in figure 5.

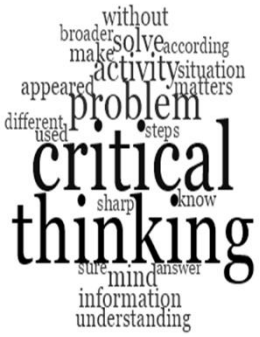
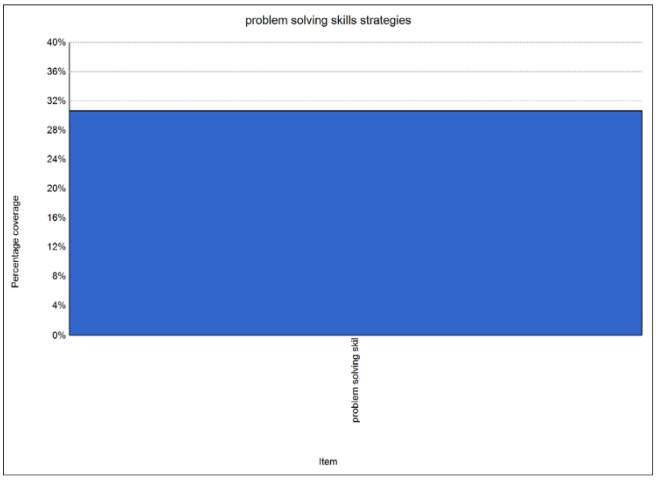


Figure 5. Word Cloud Presentation On Importance Of Critical Thinking

Chart 6.

Problem Solving Strategies



In chart 6, qualitative responses of 30% prospective teachers refer problem solving strategies to help learner in solving a problem. Brainstorming technique and heuristics methods are mostly referred to solve learner problems, these techniques vital for problem solving skills. On the other hand, they refer give clues and guide the learner to solve the problem. Inquiry based activities also refer by prospective teachers as present in figure 6.

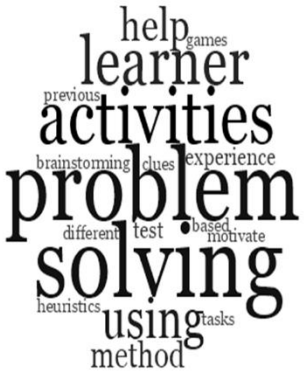


Figure 6. Word Cloud Presentation Of Problem Solving Strategies

4 Discussion

This section deals with the findings of the current study with the findings of the prior studies conducted about prospective teachers critical thinking and problem-solving skills regarding to their gender. Objective of the study was to explore the conceptual level about critical thinking and problem-solving skills of prospective teachers in district Lahore. Findings of awareness level also supported by Gashan (2015), in his article "Exploring Saudi pre-service teachers' knowledge of critical thinking skills and their teaching perceptions" who concluded that pre-service teachers indicated unsure knowledge about the skills that were necessary to promote thinking skills of students in the classroom. Present study also indicate that prospective teachers of both private and public sectors universities are aware about the notion of critical thinking and problem-solving skills. Prospective teachers of public sector are able to make their lessons in classroom effective as a teacher, but private sector prospective teachers are not able to describe that how can they make their lessons effective in the classroom. Prospective teachers of public and private sector were not able to label thinking skills strategies which can be used to develop critical thinking and problem-solving skills in learner and help them to solve problems.

Male prospective teachers of both sectors more emphasized on critical thinking and problem-solving skills than female prospective teachers, and they have better critical thinking skills and problem-solving skills than female prospective teachers supported by Rodzalan and Satt (2015), in their article "A mixed-method analysis on students' critical thinking and problem-solving skill development in Malaysian public universities".

5 Conclusions and Recommendations

The present study was designed to explore the conceptual level about critical thinking and problem-solving skills of prospective teachers in district Lahore. Findings of the qualitative responses indicated that awareness level of prospective teachers regarding to knowledge of critical thinking was better than the knowledge of problem-solving skills. Prospective teacher's views indicated that critical thinking was important in problem solving skills, but they were not sure about, that how to use critical thinking for making effective lessons. They were also not sure about teaching strategies that can be used to develop critical thinking in learner, and which help learner to solve problems.

Findings revealed that critical thinking means logical questioning process during problem solving situation and critical thinking was important for problem solving skills to get more information and understanding about reasons related to problems and surety of correct response according to prospective teachers. Critical thinking was important for prospective teacher within the problem-solving process during classroom instructions.

In the light of the above findings following recommendations were formed:

1. Educators need to focus on thinking skill strategies that can help to develop critical thinking and problem skills in the learner.
2. Curriculum planner have need to revise the teaching training syllabus regards to critical thinking and problem-solving skills to make effective teachers for future.
3. Situation based learning techniques should be employed in teacher candidates' preparation programs not only in science education but also in arts education that will help them to think critically in

different problematic situation and cope with the problems during classroom learning.

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