GENDER BASED COMPARATIVE STUDY OF CRITICAL THINKING SKILLS AMONG UNIVERSITY STUDENTS

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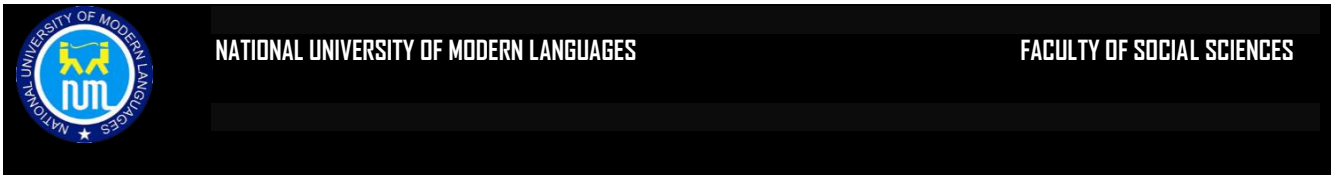

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ABSTRACT

Title: Gender based comparative study of critical thinking skills among university students

Critical thinking is procedure that helps learners to think in a creative way by using analysis and evaluating strategy. In the 21st century critical thinking skills are demand of society and learners learn these skills from educational institutions. This research was conducted to compare the critical thinking skills among university students on the basis of gender. The major objectives of the study were to explore the practices related to critical thinking skill among university students and to compare the critical thinking skill among university students on the basis of gender. The Theoretical framework of the study was based on critical thinking skills domain presented by Elena, Rave, Gabriel, Monsalve, Andrés, Botero and Brand (2017). This model comprised of five critical thinking skills domains interpretation, analysis, argumentation, evaluation and inference. Researcher used quantitative research approach. Furthermore, comparative research design was used for the purpose of data collection. For the current study population was male (4795) and female (3864) students enrolled in social sciences department N=8659. (session 2019 Fall) of public sector universities of Islamabad . Proportionate stratified sampling technique was used for this study. Research selected 10% from both strata. The sample size for the current study was n=866, male (480) and female (386). Researcher used a self-developed questionnaire based on critical thinking skills presented by Elena, Rave, Gabriel, Monsalve, Andrés, Botero& Brand (2017). The questionnaire was validated from experts of educational field. The reliability of critical thinking skill scale was (.968). Further factor analysis was run for construct validity of the items. The result showed that students were undecided about the practices of critical thinking skills and there was no statistically significant difference found on the basis of gender related to critical thinking skills. Further it was recommended that universities administration may develop activities that help and enable faculty to educate students about their critical thinking skills through their teachings skills. Teachers may adopt these skills for inculcating critical thinking skills in students.

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LIST OF ABBREVIATIONS

Abbreviation	Terms
CTS	Critical Thinking Skill
SPSS	Statistical Package for Social Science
Fig	Figure
T	t test
df	Degree of Freedom
sig	Significance (p)
Bs	Bachelor of Science (degree)
MS	Master of Science (degree)
MPhil	Master in Philosophy (degree)
KMO	Kaiser Mayer-Olkin Measure KMO and Bartlett's Test

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Laraib Mehdi

DEDICATION

To My Beloved Parents,Brothers,Sister and Supervisor

DFA Raja Ejaz Mehdi

Farhana Batool

Azaz Asjid

Musa Raza

Laiba Mehdi

Dr. Qurat-ul-Ain Hina

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

The Critical thinking skills (CTS) are pivotal in academic system and student use these skills in their academic life to achieve their academic goals and that's why it is the demand of that modern era (Almedia, 2011). Critical thinking skills allow students to think and evaluate issues critically. In past era educational institutes focused on rote memorization but now days they move toward to develop such skills that help students to understand their issues inside the institute as well outside the institute so that's why critical thinking skills is prime need of society and also requirement of higher education system to enhance critical thinking skills in student to face a difficulties in the world (Rashid & Qaiser, 2017). Critical thinking are the skills, in which person think clearly about what to do and what are perception about the given matter and it is also the skills in which person think independently and reflect on the work. In this modern time, it is the demand of work place that the person thinks individually and critically. Due to this stipulation critical thinking is the essential focus in this modern era (Acharya, 2017).

Critical thinking is an umbrella term that is used to assess information in overall way it contains questioning, analysis, reasoning, synthesis concepts and definition (Pithers&Soden, 2000).In developing countries mostly educational institutes are interested in teaching these skills to their students. The idea that teaching students to think critically is the main goal at all levels of education and it is unanimously accepted by researchers around the world (Rashid & Qaiser,

2016).Educators use different techniques in teaching to prepare their product to succeed in the world. Adeyemi (2012) stated that in this era skills of thinking critically helps students throughout their life. Critical thinking skills are higher education goal to cultivate these skills in students through different task like giving them situation to make solution, giving them assignment to critique on it for developing these skills in students. Critical thinking is the well-known skill in the education system and student use these skills in their schools for their achievement and also use in their professional life where required. Critical thinking is skill of thinking logically. It is the concept through which people understand things with open mind and logically but know students do not meet the demand of society in their work place (Thomas & Nelson, 2010). Critical thinkers have capacity to understand and interpret the things easily. It's belonging to their creativity that how they can find the solution of their problems with their logics or understanding. Critical thinking is the major component of student learning. They develop these skills with the help of educational institutions and its help students to solve the daily life issues. In the same way if students have critical thinking skills they can utilize the new information with their existing information in any difficult situation (Perkins &Murphy, 2006). Basically critical thinking is the skills of interpreting, evaluating, analyzing the idea of any content or subject.

Critical thinking is the stripe through which we decide what is true and false, according to (Wood, 2002). Critical thinking is the competency that enhanced during practice by cognitive technique and it is used. Similarly, it can enhanced by giving problem solving question and encourage student to solve these problems by applying new strategies during solving problem. Critical thinking is a process in which student break the things with their thinking ability and come to conclusion (Shaheen, 2016). Basically it is a skill to critique information you have and

to use this information in different ways. Critical thinking is the skill in which student relate the previous knowledge with new ideas and makes innovative things. It is a process in which student present their skills with their own understanding and creativity. According to Patel (2013) critical thinking is the skills that are developed by the teachers through their teaching methods. They develop these skills through demonstrate the impression through question answer techniques (Gopee, 2002). Critical thinking involves the skill through which pupils analyze, create and discover truth and solve the problem and these skills are developing at the early stage and it help student to think critically. Critical thinking is the skill in which student wide their views. Critical thinking skills are important for student's cognitive development and Teachers help their students to practice these skills (Rashid & Qasiar, 2017). Khan (2017) stated in their studies in Pakistan institute are focused on rote memorization which transfers all the knowledge in students without describing them meanings. Teachers transfer knowledge rather than explaining what the purpose behind it and they do not act like as facilitator but critical thinking is important and necessary focus of Higher Education Commission in their policy documents. The major objective of them is students should be a good critical thinker at the time of graduation or when they leave the universities after any degree. Critical thinking facilitates to solve mental and spiritual questions and it is very essential skill in modern era to evaluate all the policies of institutes and people and it also help us to avoid social problem. The first level of thinking critically is questioning and evaluating (Hatcher & Spencer, 2005). Critical thinking is helpful for students to scrutinize the complex situation and evaluate the situation with their actions and apply these actions in suitable paths (Saeed, Khan, Ahmed, Gul, Cassum & Parpio, 2012). Critical thinking practice help student to makes decision in difficult scenario in all life. Critical thinking is linked with Socrates teaching philosophy (Gagren, 2010). Effective teaching strategy

improves student critical thinking. It will increase and promote through questioning in the class. Questioning technique help students to express their ideas, and issues which come in student's mind. According to Firdaus, Kailani & Bakar (2015), Critical thinking abilities are essential for student learning process in educational life. Institutes and teachers are the main source that enhances critical thinking in students and they develop these abilities with different pedagogy skills. Critical thinking help student to solve their problem independently. Analysis, interpretation, assessment and self-regulatory are the fundamental concepts of critical thinking. In Pakistan Higher Education Commission highlight on generating "critical thinking" in students and also endorse "the consequence of critical thinking." The most important goal of the Higher Education Commission is that students should have critical thinking skills at the time when they are completing their studies (Khan, 2012). Teacher use didactic method and students learn with rote memorization because curriculum is not designed like that it encourages critical thinking in students and teacher are also not aware about the concept of critical thinking even if they are aware that they like to teach students with lecture method because it's easy way to convey their knowledge in short time. Higher Education commission major goal is produced critical thinker for the society and work place that encounter the entire problem and evaluate the things with their own reasons and propose alternative solution of the problem. But in Pakistan our focus of education is rote memorization, complete the syllabus and get good marks in exams instead of making new ideas and show quality in educational activities and that's why Pakistan educational system is ranked lowest in global ranking in 2016 this is because in Pakistan students have lack of critical thinking skills and left behind in making quality work (khan, 2018). Education organization needs to helps students to build up competencies of critical thinking. According to Myer and Dyers (2006) basic aim of education is to compose a person able to recognize his

obtainable aptitude. That is why researcher explores critical thinking skill among university students. In Pakistan education ministries must concentrate on strengthen students' critical thinking abilities through curriculum (Memon, 2007). In many researches researcher found that students did not focus on their critical thinking skills they had tendency to agree with their teachers and it is also observed by the researcher that in Institutions students considered their teachers as guru and they just fulfilling what teachers are saying instead of debating and discussion on the lecture. Durkin (2008) had done a study on the critical thinking skills of South Asian students studying in the United Kingdom and came to the conclusion that these students had a predisposition to agree with their professors' ideas, even though the lectures were designed in such a way that debate and discussion were encouraged; they guarded their opinions. Keeping in view these researches about the critical skills level in students and development of these skills in student's researcher wanted to explore the critical skill among university students on the basis of gender because in universities both gender take equal chances to enhance their skills.

1.2 Rationale of the Study

In this research researcher explore the critical thinking skills among students. For this purpose researcher followed critical thinking skills domains by Elna etal (2017). Critical thinking skills is way of reasoning that help and defends believes and unwillingness. It is important for learners to think with analytical and evaluating strategy. Developing critical thinking skills in students is a goal of higher education commission. All educational institutions, certifying organizations, students, and employers agree that students improve their critical thinking abilities by practices and experiences. The good news is that there is significant evidence that training may promote critical thinking. Good critical thinking skills lead to the capacity to reach the correct conclusions more frequently (Halpern,2003). students needs to develop critical thinking skills in these

modern days and institution are also working on it to develop critical thinking skills in learners (zulfiqar, 2018). In the 21st century it is the demand of the society to use critical thinking skills in everyday tasks. These vital skills are used in every situation of life, including problem solving, goal achievement, and making accurate decision. According to Paul and Scriven (2004) critical thinking is the process in which student make concepts, present and make final conclusion of things which they are analyzing through their reasoning skills. It is the student ability that how they can perceive the things using their previous and new knowledge. Critical thinking is a skill that is used to solve problem and find answer with complete information and evidence and make a valuable answer (Rudd et al., 2000). Critical thinking is most crucial skills for students to become a Patron in this globe through their work. According to the survey (American Management Association, 2012), critical thinking skills for the development of the organization. It is essential in this modern era because technology changes rapidly, which is why the organization needs a skilled person who adapts and thinks critically and has reason to adapt to this change. On the other way Moon, 2008; Franco, 2016 showed that Inculcating critical thinking skill in students at higher education level is a major role and their focus is practicing critical thinking in applicable way. According to Bailin & Siegel, (2003), Mayweg-Paus, Thiebach, & Jucks, (2016), Kivunja, (2015) from the many years the main goal of higher education is to improve student critical thinking skills and all faculty agree that critical thinking skills are very significant for students at this stage. Lindholm, Szelenyi, Hurtado, and Korn (2005) also describe in their studies that emergent critical thinking skills are imperative ambition for university students. According to Grant and Smith (2018) civilizing student critical thinking skills are considerable task of higher education faculty. According to Khan (2017) numerous studies are conducted on the development and importance of critical thinking skills at both

schools and universities level and there is no issue come up with the assessment of these skills in term of developing frame of critical thinking skills and it is also based on what happened at school level in Pakistan. In school knowledge is transmitted through memorization where in universities mode of teaching is different and teachers tried to teach these skills through their teaching methods because Higher Education major goal is to developed critical thinking skills in students to produce a better product for the society.

HEC (2012) Major goal of Pakistan higher education is to produce critical thinking skillful students because this is the last step to learn these skills as after graduation they work in their field that's why it is important to learn these skills in higher education level. Hoodhbuoy (2009) argues that students take a degree after working experience in higher education, but due to the lack of critical thinking skills, they are unable to evaluate things and make connections. In their research (Bok,2006; Arum & Roksa, 2011) they describe the importance of critical thinking instead of it they also claim that college and universities students are unsuccessful to develop these skills and students did not think critically and they feel difficulties in complex situation. Khan (2017) Critical Thinking skills are seen as incredibly appealing way of thought that must be implemented overall aspects of higher education level. Although this thing is not easy to comprehend critical thinking skill in the terms with the aim of assist in its expansion and appraisal. In Pakistan recent document of policy have emphasized the (CTS) development in higher Education. The Pakistan Higher Education Commission collaborated with USAID to publish new compulsory courses direction. The courses main goal is providing reasoning and makes a distinction between fact and opinion to explain a position. The basic purposes of these courses are to improve these skills in students. All of these goals enable students to learn skills

that include questioning, asking question about what is offered, who provided it and what was the meaning of it could exist and core characteristics about (CTS).

In reading different researches researcher observed that many researcher were conducted on the topic of critical thinking skills and its importance among students at different academic and researcher also observe that in higher level few researches are conducted on the basis of gender that show comparison of on critical thinking skill in students. The researcher observed this gap that critical thinking skills are important to enhance in students but these gaps should be properly checked. So keeping in view researcher selected this area to explore and compare the critical thinking skill among university students on the basis of gender by using Elena etal critical thinking skill domain by (2017) that's why researcher wanted to explore the critical thinking skills of university-level students. As it is important and demand of 21st century that students had ability to think and solve issues through using their critical thinking skills. It is also observed in some researches that sometimes gender found difference regarding using these skills. That is why researcher conducted a gender based comparative research to explore and compare the critical thinking skill among students of public universities of Islamabad.

1.3 Statement of the Problem

Critical thinking related to all types of information and means that learners are truly engaged in the process of knowledge production by reflecting and thinking carefully. Curiosity and inquiry are essential traits of critical thinkers because they are continuously looking for solutions to the questions they pose. In the area of Education there is need to conduct a research to explore the practices of critical thinking skill among university students on the basis of gender. Higher education is the last level where student have last chance to enhance their critical thinking skills academically. Critical thinking is the competency in which student evaluate the arguments and

make valuable judgment. Moreover gender difference was found regarding critical thinking among students. In some researchers results indicated that skills male can solve problem with great strength and sometime female demonstrate the things well. So keeping in view the different levels of critical thinking in students. Developing critical thinking skill through compulsory subjects is a goal of Higher Education Commission that's why researcher explore critical thinking practices of learners in university level and also compare these skills on the basis of gender because both genders are studying in the university. Here we had some misconception too that girls absorbed the things very well. Higher Education commission emphasis on (CTS) advancement that's why current research intended to explore the practices related to critical thinking skill among university students because this level is the most important element in deciding the profession and future of students and it is also observed that in university level developing critical thinking is based on what was happened in school time and at the university level they can enhance their skills through practice for becoming to know the practices this was the objective of study to explore critical thinking skills in students . Thus the research was designed in keeping view of critical thinking skills of students as a result, the study main objective was to compare the (CTS) of university students by gender because it is a misconception or observed things that girls can thinks better than boys and not to favored any gender this study compare these skills on the basis of gender. The present research was aimed to know how critical thinking skills differed depending on their gender. In Pakistan's university system university system ensure that our universities produce critical thinkers for society and after graduating from university students use these skills in their workplace so the research purpose was to explore the practices of :critical thinking skill among university students and to compare the critical thinking skills between gender among university students.

1.4 Research Objectives

The research objectives were:

1. To explore the practices related to critical thinking skills among university students.
2. To compare the critical thinking skills among university students on the basis of gender.

   2a. To compare the interpretation skills among university students on the basis of gender.

   2b. To compare the analysis skills among university students on the basis of gender.

   2c. To compare the argumentation skills among university students on the basis of gender.

   2d. To compare the evaluation skills among university students on the basis of gender.

   2e. To compare the inference skills among university students on the basis of gender.

1.5 Null Hypotheses

The research hypotheses were:

H_{o1}: There is no statistically significant difference in critical thinking skills among university students on the basis of gender.

$H_{o1(a)}$: There is no statistically significant difference in interpretation skills among university students on the basis of gender.

$H_{o1(b)}$: There is no statistically significant difference in analysis skills among university students on the basis of gender.

$H_{ol(c)}$: There is no statistically significant difference in argumentation skills among university students on the basis of gender.

$H_{ol(d)}$: There is no statistically significant difference in evaluation skills among university students on the basis of gender.

$H_{ol(e)}$: There is no statistically significant difference in inference skills among university students on the basis of gender.

1.6 Theoretical Framework

The Theoretical framework of the study was based on the skills of critical thinking presented by Elena, Rave, Gabriel, Monsalve, Andrés, Botero and Brand (2017).The five critical thinking skills included in this model were interpretation, analysis, argumentation, evaluation and inference.

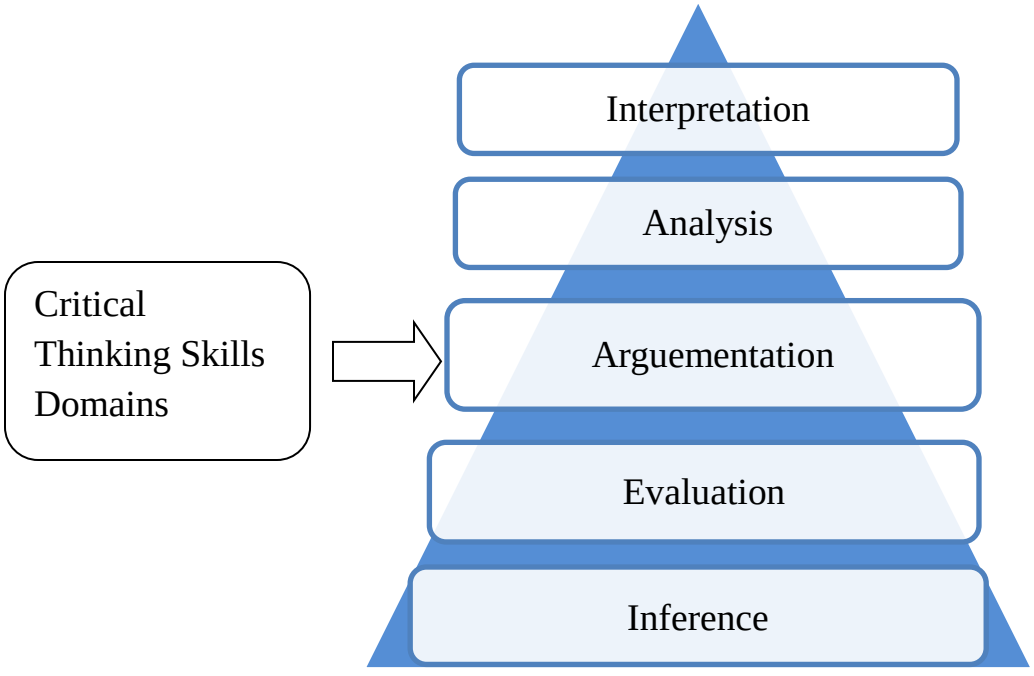

Figure 1.1 Theoretical framework of the study Elena, Rave, Gabriel, Monsalve, Andrés, Botero and Brand, (2017).

1.6.1 Critical Thinking

Critical thinking refers to accomplish the graph of conception of logical thinking, and criticize the new ideas through general to specific and specific to general to make valuable conclusion from confusing statement.

1.6.2 Interpretation

Halpern (2014) said interpretation is the process of demonstrating the meaning in another way. It is the method of expressing thoughts in artistic form.

1.6.3 Analysis

Possin (2014) said in critical thinking process analysis make logical thinking between evidence and reasoning and make relation between question and truth. It refers the way that is developed by looking things in different ways. Basically it is the study of something that determine essential feature of reasoning.

1.6.4 Argumentation

Ennis (2009) said argumentation is a step of making conclusion with reasoning and applying it in the discussion. It is logical to discuss an idea, through this process speaker come to the point. Selecting and presenting the thoughts in logical way is the process of argument to convey own message.

1.6.5 Evaluation

Facione (2015) said evaluation assesses the reliable information through logical way. It is process of learning new things and makes decisions and also judging the worth. It makes a report that includes information whether it’s genuine or assumed. This is best way to organize the information and then analyze to come on the result.

1.6.6 Inference

Facione (2015) said inference is concern with idea or reason that is developed by reasoning; basically it is a guess which is draw through path. It involves reasoning through which we draw hypothesis using available true knowledge. This process of reasoning is based on what we actually know and focus on facts which we think and make valuable conclusion.

1.7 Significance of the Study

This research would be beneficial to students, educators, policymakers, along with administration of the universities in all sectors. The study would spotlights the student practices related to critical thinking skills and do gender base comparison. Also the study would explores the practices of student's critical thinking at university level because this is the last level where student can enhance their critical thinking skills. The result of study would give better understanding that how student use these skills in complex circumstances after completing their studies or in their professional life.

The study would be useful for policy makers to make activities and program according to enhancement of critical thinking skills and make strategies through which students enhance their critical thinking skills at this level.

This study would be helpful for teachers to make universal framework for students and evaluate their student's critical thinking skills according to this model. The result of this study would be helpful for teachers to develop their teaching strategies and provide direction that enhance their critical thinking skills.

Teacher enhances interpretation skill in students by giving them task (assignment and projects) to check the artistic way of students. It is also helpful for students to understand the concept of interpretation.

This study also enhances the argumentation skill through questioning. Teacher and students in class develop this skill in class. They both develop the importance of critical thinking skill and used this skill for enhancement.

Study would be helpful for students to create a better understanding of critical thinking in education. It would be helpful for students to analyze and evaluate their critically thinking abilities in complex scenario.

Through exploring and evaluating this area administrative used these result and formulate different activities that enhance critical thinking in students and work on developing framework that inculcates these skills in students regarding critical thinking.

The result of study would provide a foundation for educational institutions to evaluate the critical thinking abilities of students. Overall finding of this study would be helpful and useful to point out that how critical thinking developed at higher education level in Pakistan. It is also helpful to raise the importance of critical thinking skills in students at this level.

1.8 Methodology

1.8.1 Research Approach

The researcher used a quantitative research approach for this study because whenever researcher need to collect data in numeric way, quantitative approach for analysis is more appropriate**.**

1.8.2 Population of the Study

The total registered students of social sciences department in public universities of Islamabad was 8659 among those 4795 students were male and 3864 were female students. (See, Appendix G).

1.8.3 Sampling Technique

The proportionate stratified sampling approach was used.. Researcher choose the same percentage of male and female students from each strata

1.8.4 Sample

Sample size for study was 866. That would be 10% of the total population. Researcher picked 10% with the both strata. In this way 480 male and 386 female students were chosen as the sample.

Table No. 1.1

Sample of the study

Group	Population	Sample
Male	4795	480
Female	3864	386
Total	8659	866

1.8.5 Research Instrument

Researcher used a self developed questionnaire as tool which was based on five Critical Thinking Skills Interpretation, Analysis, Argumentation, Evaluation, and Inference

(See Appendix I) presented by Elena, Rave, Gabriel, Monsalve, Andrés, Botero & Brand (2017). The tool consisted on 78 items. In which 76 which were focused on five sub skills of Critical Thinking and 2 open ended questions were used to know the knowledge of critical thinking. Details of the tool are described as under:

Table No 1.2

Description of Critical Thinking Skill Scale

Scale	**Sub Variables**	**Items**
Critical Thinking Skills	Interpretation	15
	Analysis	15
	Argumentation	15
	Evaluation	16
	Inference	15
Total Items		76

1.8.5.1 Validity of instrument

For the current study researcher was consulted five experts from the field of education to check the instrument validation (See Appendix-E).

1.8.5.2 Reliability of instrument

The instrument of this study was administered on 40 social sciences students of public universities in Islamabad for pilot trail Cronbac's Alpha reliability, Intersection Correlation and Item total Correlation was calculated. After that weak items were amended.

1.8.6 Factor Analysis

Due to limited time and data tool was finalized at the pilot trial stage. However after complete data collection factor analysis was additionally run and revised tool were given in (Appendix K).

1.8.7 Data Collection

The data was collected from social sciences students of public universities Islamabad. Due to COVID and lockdown scenario it was impossible to collect data by personal visit. As a result researcher collected data from an online source.

1.8.8 Data Analysis

Statistical Package For Social Science (SPSS) was used to analyze the data., mean and t-test were used in this study due to objectives and hypothesis .

Table No. 1.3

Description of objectives, hypothesis, instruments and statistical analysis

Objectives	**Hypothesis**	**Instrument**	**Statistical test used**
To investigate the practices related to critical thinking skills among university students		Questionnaire	Mean
To compare the critical thinking skills among university students on the basis of gender.	There is no statistically significant difference in critical	Questionnaire	t-test

		thinking skills among university students on the basis of gender.	

The table 1.3 showed the objectives, hypothesis, instrument and statistical test of this study as it was a pure quantitative research that is why objectives and hypothesis were made. The first objective was “to explore the practices related to critical thinking skills among university students”. Researcher analyzed the practices through questionnaire by using statistical technique mean and the second objective was “to compare the critical thinking skills among university students on the basis of gender”. Hypothesis was generated and for comparison t-test was applied as it was a gender based study where there were two main groups.

1.9 Delimitations

Due to lack of time and resources the study was delimited to only below statements.

1. Only Public universities of Islamabad recognized by Higher Education commission.
2. Confined to students of social sciences department because due to time constraints Researcher was unable to collect data from all departments of the universities and Researcher also belongs to social sciences department that's why Researcher decided to compare critical thinking skills on gender-bases in university students.
3. Restricted to all the subject come under the category of social sciences department. (See Appendix J) for complete list of subject provided by higher educational commission.

4. Self developed questionnaire was used because researcher used the model by Elena, Rave, Gabriel, Monsalve, Andrés, Botero and Brand (2017).The five critical thinking skills included in this model were interpretation, analysis, argumentation, evaluation and inference and researcher also did not find any suitable questionnaire related to these skills in context of Pakistani Culture that is why researcher used self developed questionnaire for this study.

1.10 Operational Definitions

The Researcher explained the operational definitions about the research topic in the following headings.

1.10.1 Critical Thinking

In this research critical thinking is used for making conclusion with logical thinking and contemplative to think about what to do or suppose and to create a valuable conclusion from an unclear statement, Critical thinking comprises covering the graph of logical thinking conception and criticizing new concepts from general to specific and specific to general.

1.10.2 Skills

It is an ability and kind of actions or activities which require guidance to do things in good manners with expertise.

1.10.3 Ability

It is an inborn quality of doing something and also a physical and mental power to do job in well manners.

1.10.4 Competency

It is ability of doing work in efficient manner. Its involve skills and ability.

1.10.5 Interpretation

It is the process of demonstration and revealing design through involvement and expresses their thoughts in artistic way.

1.10.6 Analysis

It is the way of examine the nature in detailed manners and understand the important feature of complex things through developing a logical link between proof and reasoning, as well as a link between the question and the facts. Essentially, it is the investigation of something that determines a key aspect of reasoning.

1.10.7 Argumentation

It is the skill of discussing things with assembling knowledge, make conclusion and convey it to other in argumentative way. It is the process of coming to a conclusion by logic and putting it into practice in a discussion and convey the opinion in argumentative way.

1.10.8 Evaluation

It is the process of learning new things and analyzing the things for giving valuable judgment about the information whether it is genuine or assumed. This is way through which come to valuable judgment.

1.10.9 Inference

It is the skill of making conclusion on the basis of knowledge and using previous knowledge to make opinion on it. By making hypothesis come to conclusion.

CHAPTER 2

REVIEW OF THE RELATED LITERATURE

A review of the literature of this study is discussed in this chapter by reviewing the main study variables, Critical Thinking Skills (CTS) and gender. The majority of the literature has been collected from secondary sources available online; Books, journals, articles, and thesis are the sources of literature review.

This chapter begins with a brief introduction to (CTS) and continues with the analysis of (CTS) and gender literature. This chapter also includes a description of the model relevant to critical thinking skills that the researcher is following for the current study.

Section 1 is Related to General Introduction of Research Area

2.1 History and Evolution of Critical Thinking

The roots of critical thinking were related to Socrates 'teaching practice' 2500 years ago he used questioning method at that time people did not explain their assured state to knowledge. Insufficient evidence or conflicting convictions also lay beneath most popular theories and beliefs (Fahim & Bagheri 2012). Socrates builds this fact that no one can rely and believed on sound knowledge and insight from those in authority. All the people have power and they have high position instead of that they are profoundly confused and difficult to deal with their knowledge. Socrates start questioning session and build up the importance of asking questions

that test deeply before accepting the idea as worthy of belief Socrates formed the theory of critical thinking or simply challenge to some common supposes and theories in respective way and those views that are reasonable and logical from those without hard proof or factual basis to justify our conviction, are carefully unconnected. He considered the value of finding proof, closely analyzing logic and theories (Atabaki, Keshtiaray & Yarmohammadian, 2015). According to Bali (2015) Critical thinking is a Western idea that, as its history shows, evolved and flourished in the Western culture due to advantageous conditions. Critical thinking development in non-western civilizations cannot be undertaken unless the local circumstances are properly explored.

Alwehaibi (2012) Critical thinking can be defined as the ability to not only acquire but also make sense of new information. In 1997 paul, Batrell and Elder describes in their study and Nicholls (2002) also stated that The French scholars Bayle, Montesquie, Voltaire, and Diderot was made another valuable contribution related to critical thinking. These researchers begin their study with the assumption that when order by cause, the human mind is better able to comprehend the social and political nature. According to these philosophers the important aspects of reasoning must turn on their own to assess its weakness and strengths. The group of these party praised structure exchange in which all opinion had to be seriously examined and criticized

According to Bacanli, Dombayci, Demir & Tarhan (2011) The philosophy of critical thought was extended by thinkers of the eighteenth century, gaining a sense of the value of critical thinking and its method. Spencer and Comte expanded critical thought far farther into the area of human social life in the 19th century. Deutscher (2004) said that The use of critical thinking, the applied history of human culture and the basis of biological life in 1871 led to Darwin's The Descent of Man and the selection of gender relationships It was also mirrored in Sigmund

Freud's works, referring to the unconscious mind. The application of critical thinking began to develop into the 20th century, where the understanding of critical thinking's influence and essence emerged in ever-clear ways. Byom and Mutlu (2013) stated that in 1906, an analysis of sociology and anthropology concepts called Folkways was published by William Graham Sumner: a study of practices, manners, custom, views, and morality in the sociological context. He defined in his book the propensity of the human mind to think socio-centrically and proposed a similar tendency for schools to serve the role of social indoctrination. Sumner recognizes the deep need for critical thinking in life and education.

Botell, Zenasni and Lubart (2015) stated that Criticism is the review and evaluation of ideas of any kind proposed for approval in order to determine if they correspond to the reality or not. Critical faculty is a consequence of education and training. It is cognitive habit and energy, it is the prime condition of human welfare that women and men should be educated in it

John Dewey endorsed the concept of Sumner and said that living things had strengthened their sense of human thought's pragmatic basis and based their real human purposes, objectives and goals (Thompson, 2005). . Lefa (2014) stated that From piaget's work we learn that we should increased awareness of human thoughts like egocentric and sociocentric in order to foster (CTS). Critical thinking has been around for a century discussion took place in several academic circles with participant debating and discussing on it. Many philosophers try to give clear definition of critical thinking (Obrien, 2013). Ennis (2011) gave a precise definition that thoughtful and realistic is based on what to believe or do. Over the past two decades agriculture educators tried to define critical thinking. Lauer (2005) describe that critical thinking skill become a centeral focus of education these days.

Although Rudd & Baker (2000) recommended the definition that, “Critical thinking is a rational, purposeful and introspective approach to problem solving or addressing issues with insufficient evidence and information that is unlikely to find an inconvertible solution.” Some of critical thinking agricultural studies explore cognition and higher order thinking level. Rini, Tantra & Dewi (2020) said that tried to evaluate the academic level of performance and critical thinking skills of the student and found that reading and speaking competencies are higher than thinking critically. They found that in part of critical thinking that all student scored the lowest and they also found the relation link between (CT) and level of their ranks. again done this study and found that students were scored lowest in developing cognitive abilities test critical thinking component. Graham, Gartoon and Gowdy (2001) said that teachers are more credible to emphasize basic skill of (CT) rather than abilities and they will learn through their critical prespective and these are skills those are necessary for critical thinking. Friedel et al. (2008) showed that after teaching in college students about (CTS), (CT) abilities affected the scores and its make positive influence on it. Rudd, Baker and Hoover (2000) argued that agricultural educators and researchers should study critical thinking closely. Taking lower score that expected scores willingness to think critically among agricultural students and this is used in college in college by faculty member to develop inquiry or drawing to making connection in the area of critical thinking.

Critical thinking has fundamental and significant aspect in modern education system for every field and many people show its importance in the field specially people who work as educationists their major goal was inculcated critical thinking ability in students (Finkelman, 2001).

2.2 Concept of Critical Thinking

Employees and managers who practice critical thinking are forced to look beyond traditional methods in search of fresh ideas that can help them solve issues more effectively. While looking for the word ‘critical thinking ‘. It is understood that definitions are implied in the philosophy and psychology sciences context but this concept does not have a definite meaning in general terms. critical originating from the Greek word kritikos meaning to be judged, originates from the way analyzes and Socrates argument at that time involved thoughts (McLennan, 2005). Khansa (2016) stated that Hançerlioğlu define the critical thinking as The term kritikos then moved as a critic to the Latin language, which is the kind of spreading it to world languages Lyer (2019) said in their research that Critical thinking is the ability that goes beyond memorization According to critical thinking cooperation (2006). As students think independently, they are inspired to think for themselves, question ideas, analyze and synthesize events by generating novel concepts and evaluating them against evidence. Questioning is the cornerstone of critical thinking, and is the root of knowledge development and can be learned as a base for all learning. According to Sharma & Elbow (2000) Learners are informed by teacher-centered, classroom-driven textbook engagement in their learning approach. For contemporary educators, this situation is a disturbing case and for this purpose, they would like to choose the new models and approaches that are more effective in guiding students to interact. In the field, of critical thinking it is not distinct. All the educationists’ philosophers are not committed on its exact terminology but frequently it is known and used as a critical thinking or higher order thinking by philosophers Although critical thinking is one of the most important concepts in 21th century, its origin belongs to Plato. Philosophers such as Socrates, Plato, and Aristotle regarded critical thinking as the ability to ask questions, test, and think about ideas and

values (Wilgis and McConnell, 2008). Critical thinking is the way that is used to recognize the think that what is valid and what is false. Its help us to identify things with reason and able to identify the value able things from the argument and help them to make decision. Critical think are activist that discover all the ideas (Wood, 2002). Critical thinking is a procedure of thinking skillfully with conceptualization, applying, dissecting and also /gets information through observation and clear thoughts with experiences There are different ideas about critical thinking because critical thinking is a complex concept and includes complex activities and mental processes that are not easy to describe and measure (Vacek, 2009). According to Zhou, Huang and Tian (2013) critical thinking is not the instructive choice of education. It is the basic piece of education training. Critical thinking is logical and contemplative way of thinking that makes decision regarding what is best for doing (Ennis, 2011). Critical thinking interjects following skills that will help in making decision, analyze facts, making sensible indicators and facilitate out to crack complex problem (Halpern, 2010).

According to Facione (2013) Critical thinking include 6 wings

1. First one is interpretation that is process of discovering fact,
2. Second Analysis in which thinker break all information in to part to exclude irrelevant content,
3. Third Evaluation extent things from the information
4. Fourth Conclusion come on the right things which is useful,
5. Fifth is explanation in that case thinker defend his argument in front of others, and
6. The sixth is self-regulation is the process of control the emotion and thoughts and make clear goals.

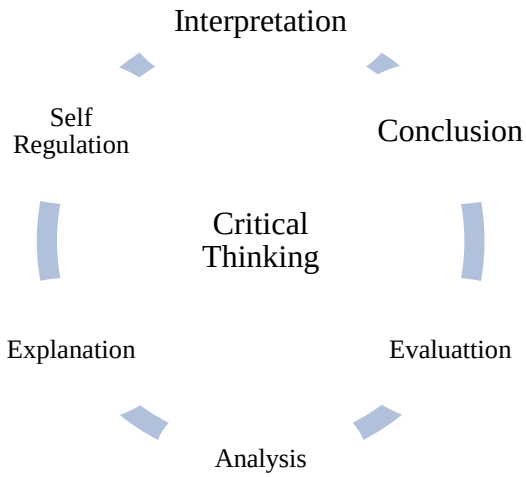

Figure 2.1 Facione, Critical Thinking

It stated that fundamental critical thinking skills are characterized as the ability to provide important inquiries and problems, define them clearly and legitimately, collect and evaluate relevant data, use dynamic plans to adequately decipher them in order to achieve clear ends and arrangements, test them against significant, liberal criteria and models in the organization of elective reasoning, perceiving and surveying their needs, assumptions, ideas, and helpful consequences, and successfully sharing with others to search for solutions to boggling problems of the mind (Elder & Paul, 2009). Critical thinking is at stake for educated people in the economic sector (Jones & Pimdee, 2017). Plato discuss 25 year ago that thinker identifies things and find their solution with the facilitation of critical thinking through contraption and teacher believe that skill will increase through discussion instead of transmit knowledge to students (Changwong sukkhamart & Sisan 2018).

Colleges are responsible for developing critical thinking skills in student that help student to turn toward higher order thinking skill (Bassham, Irwin, Nardone &Wallace,2013). Critical thinking is the skill in which thinker analyzes the content and make valuable judgment to making into

pieces and it is the ability of showing your opinion or thought regarding knowledge in broad way to show your understanding about subject in open mind (Shaheen,2016).

Gadzella, stakes, Stephen and Masten (2005) stated in their research about Watson and Glaser (1980) Attitude, knowledge and ability is the union of critical thinking that included,

1. Identify the presence of issue and accept it to support what is truth with ability and curiosity,
2. Through getting true knowledge make a conclusion,
3. Generate a new idea with logics,
4. Apply theses knowledge and attitude through abilities in best way.
5. The basic purpose is that always analyzes the new knowledge and assesses with critique and support with sensible facts and then used it in daily life.

Critical thinking is the essential goal in all level of educational system. It characterizes that critical thinking skills enhance, asking questions, analyze truth, take authentic information, and evaluate result Lyer (2019). According to Zhang (2007), theorist and educators in the field of learning theories have offered various definitions to describe the nature of critical thinking. In order to promote students to think critically, one must employ primarily these components; the core critical thinking skills (Facione, 2011) which are

1. To create inference to identify and secure the elements required to draw reasonable conclusions; to form hypotheses and conjectures; to consider relevant information and deduce the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation;
2. To investigate assumptions All reasoning must start somewhere, which means that certain facts must be assumed. Any "fault" in the assumptions or presuppositions upon which the reasoning is founded is a potential cause of difficulties in student thinking. Assessing

reasoning abilities entails evaluating their capacity to understand and express their assumptions, again in accordance with the appropriate criteria. The assumptions of the learner may be presented explicitly or ambiguously; the assumptions may be justified or unjustifiable, critical or irrelevant, consistent or inconsistent);

3. To make deduction (logical reasoning) Deductive reasoning (facts, certainties, syllogisms, validity, truth of premises good arguments and conclusions) and inductive reasoning (different facts, probability, generalisations, hypotheses, analogies inductive strength) are the two techniques of reasoning.
4. To make interpretation grasp and communicate the meaning or importance of a wide range of experiences, circumstances, data, events, judgements, norms, beliefs, rules, processes, or standards; and
5. To make judgment assess the logical strength of the actual or intended inferential relationships among statements, descriptions, questions, or other forms of representation; and assess the credibility of statements or other representations that are accounts or descriptions of a person's perception, experience, situation, judgement, belief, or opinion.

According Buskist and Irons (2008) mention that such an enterprise requires students to learn several subtasks which include, among others:

a. Developing a suspicious mindset when solving problems and making decisions;
b. Taking difficulties and breaking them down into their simplest forms;
c. Finding evidence that both supports and contradicts a particular view;
d. Keeping a wary eye on their own personal biases, preconceptions, and ideals that can sway them from making an objective conclusion.

According to Wilgis & McConnell (2008) In the 21st century critical thinking is the capacity to think for yourself and make choices that reliably and responsibly affect one's existence. Because critical thinking is a complex notion that encompasses complex actions and mental processes that are difficult to describe and assess, there are many different perspectives on it (Vacek, 2009). According Jhonson (2007) Critical thinking is also critical research, because critical thinkers analyze topics, raise questions, ask new answers that challenge the status quo, find new evidence that can be used for good or bad. Questioning challenging institutions and common values are earned and end up with greater influence in society than their numbers. It may that only a limited number of critical thinkers can accept a workable environment or culture, which reading, internalizing and practice science and the discouragement of critical though. Many people do not question and are not interested in people becoming adherents of authority and they do not have figures of authority that assert unique expertise or insight. Therefore mostly people rely on other thinking but do not think for by self. People often engage in wishful thinking, optimistic thinking and getting sentimental, pretending that what they believe is real whether they desire it, expect it or assume it is true. Naseri & Saion (2012) stated that there are many elements of critical thinking. Life can defined as a series of problems to be solved for one self by each person. Critical thinking skills are nothing more than the ability to solve problem that contribute to reliable knowledge. Data is continuously processed by humans.

Paul (2014) Stated that critical thinking is the platform to reach toward education mind. Critical thinking did not come without effort it makes arrangement and dreary presentation to practice create intellectual reasoning of student. The skill of adapting new things and examine the core of critical thinking.

Brown and keeley (2000) stated that critical thinking is accomplish the graph of conception of logical thinking, and criticize the new ideas through general to specific and specific to general to make valuable conclusion from confusing statement. Critical thinking are useful for the student in school life and as a citizen in this modern era. It is useful for student when student is participating in the class, when writing on topic with using previous knowledge, when making argument about any topic to clarify it, to do critique on any text etc.

According to Paul (2005) Critical thinkers, in other words, are always scrutinizing and criticizing their own thinking. Critical thinking is necessary and valuable for student to prepare them for future to deal with difficult challenge that will appear in their life after schooling or in their professional life at the level of when they make their own commitment and agreement.

Critically thinking is an idea with wide expansiveness. Social activity and imaginary action are summarizing through it and in critical thinking composition is expose by discussion, in the practice of critical thinking text are transformed through different writing, through this way they not also replicating knowledge but also reproducing new knowledge (Vyncke, 2012).

Stapleton (2011) did a research about teachers' critical thinking skills. The result of the research showed that although critical thinking is a part of curriculum in Hong Kong, most teachers in high schools are not familiar with critical thinking skills and methods of teaching it. Thinking critically are the halfway of philosophical thoughts and it's the serious progression of engaging cognitive skills like analysis, evaluating, deduction and induction. Hove (2011) did a research about the development of critical thinking in high schools. Investigating the effect of teaching critical thinking strategies on students thinking skills was the goal of the research. Findings showed that performance of those students who were taught by critical thinking strategies were

better than the others. This process interprets and discovers significance and make connection between ideas, in evaluating test the argument that which is best and validate the statement and give solution with best arguments. In deduction it is claimed that may be knowledge id valid but the end of this it will be false that why, It is necessary to make valid conclusion and Induction thinking support that conclusion is true (Paul and Elder, 2002).

Thinking skills help student to analyze, evaluate and create new things with education and make students energetic to thinking critically (Conklin, 2012). According to Halpern (2003; 2010) stated that Critical thinking skills are important and beneficent for student to learn new path to enhance their thinking skills and it's also help them to think creative with their high and dazzling thinking style.

Student should develop critical thinking skills to make decisions, solve problems and excel in their careers as indicated by their historical implication. There are two factors of critical thinking a disposition to critical thinking and critical thinking skills (Giancarlo & Facione,2001).

A critical thinking disposition is a personality trait that helps to think critically of an individual.In the short term, this isrelatively stable but can change over time (Facione, Facione, & Giancarlo, 2000). Critically thinking skills are those skills and abilities that critical thinkers usually use.

One of the most important components of human life is thinking. To be successful in solving difficulties in tough situations and having effective and sharp communication with others, everyone requires critical thinking skills. Critical thinking abilities enable people to take a critical look at societal issues and, rather than unquestioning imitation, attempt to resolve them. To make crucial life decisions, everyone must study and evaluate their living conditions.

Educational experts have been concerned in recent years about students' incapacity to reference critical thinking skills. Growing pupils' mental talents has always been a challenge, but it is now more important than ever because our information output exceeds critical thinking skills (Meyer, 2007). The ultimate purpose of training is to improve one's ability to think, which is an important part of the educational period. There are various educational approaches, but they all agree that the end result of education is thinking. However, some argue that “thinking in the educational system is in jeopardy” (Heidegger, 2001).

Wood (2000) stated that critical thinking is the practice of using logic to distinguish what real and what is incorrect we hear every day in phrases and sound bytes. There is no question that critical thinking is important in all areas of life but particularly in profession that deal with people. Finkelman (2001) noted the importance of critical thinking as a therapist, counselor and educationalist in the practice and management of people working in the field of human health, especially those who are directly involved in the development of the person. To be able in their classroom to implement critical thinking, teachers and counselors must first engage in critical thinking and its philosophy.

According to Hitchcock (2017) critical thinking have some considerable commonality

1. Critically thinking is the kind of thinking
2. Critical thinking is used in all subjects.
3. Its involve looking back contemplating suspending judgment.
4. It is fair to have good critical thinking thoughts
5. It includes considering the fact carefully
6. It is aimed at making a definitive decision.

7. It is appropriate for perfect critical thinker thinks objectively.
8. Being a critical thinkers its involves knowledge, abilities, attitudes, and arrangements.

According to Facione and Facione (2006) critical thinking is the process of thinking with following aspects before thinking thinker examine the idea, evaluate the knowledge with thinker already know and make valuable decision according to merit. The purpose of critical thinking is making specific objectives at that time when thinkers is judging all the things critically. According to Cosgrove (2011) Critical thinker evaluate all the arguments and judge the strengths and weakness of the knowledge. So that basically critical thinking is the process of testing argument with evidence and than prepare to claim it and support the idea. So critical thinking includes:

1. Actively observe the arguments before the knowledge and after the discussion
2. Evaluate the arguments that it is effective or valuable
3. After testing if it is valuable support it with their claims.

According to Akhras (2018) Critical thinking maintain specific objectives. Its means if thinkers try to do any arguments he should aware about any preconception sand squeeze the idea in arguments. Thinkers allow herself to give opportunities to check understanding and re-examine . even though there is no exact of critical thinking we can discover it is useful to perform some basic task before proceeding with the assessment of any material. critical thinking improved by using three stepladder

1. Recognize the power of the knowledge.
2. Examine the objects or idea.
3. Evaluate and relate the knowledge with previous knowledge

“Critical thinking is thinking about your thinking while you’re thinking in order to make your thinking better.”—Richard W. Paul

When the phrase 'Critical Thinking' is searched, it is clear that there are interpretations offered in the context of philosophy and psychology sciences, but in general, this term lacks a specific meaning. According to Critical Thinking corporation (2006) Critical thinking is a skill that goes beyond memory. When students think critically, they are encouraged to think for themselves, to challenge assumptions, to evaluate and synthesize events, and to go one step further by generating new hypotheses and testing them against the facts. Questioning is the foundation of critical thinking, which is the basis of knowledge production, and as such, it should be taught as a framework for all learning. Students' approaches to learning are typically conditioned by experiences in teacher-centered, textbook-driven classes (Sharma & Elbow 2000). This is a troubling scenario for modern educators, and as a result, they would prefer to use the most recent models and approaches that are more effective in leading pupils to think. When students analyze, evaluate, interpret, or synthesize information and use creative thought to construct an argument, solve a problem, or reach a conclusion, they are engaging in critical thinking. According to Lyer (2019) The goal of Critical Thinking is to encourage independent thought, personal autonomy, and reasoned judgment in thought and behavior. This involves two dimensions that are linked.

1. The thinking of ability well and
2. The disposition to do so

This list is clearly incomplete, but it serves to demonstrate the type of thought and attitude to life that is known as rational thinking. Related definitions of critical thinking qualities are present in the very broad literature of critical thinking. According to (Wright & pedersen 2002) There are

several features of logical thought. Critical thinking expertise is nothing more than problem solving skills that contribute to accurate knowledge. Data is continuously processed by humans. Critical thinking is the practice of analyzing this report is very important detailed and thorough possible manners, in such a way it is accurate to lead , rational and dependable judgments about which responsible judgments can be reached with full knowledge of their assumptions and effects about one's existence, behavior and acts.

The interaction of logical thought, higher order thinking skills, informal logics, argumentative problem solving. There are difficult challenges with objective reflection, reflective assessments and reaching cognition. Concerns and deviations in other areas include according to (Facione, 2015).

1. The extent to which critical thinking is specific to specific subjects,
2. Different variation in a discipline among specialist and inexperienced thought and the degree through which inexperienced people learn to behave more expertly.
3. Difficulties in dividing higher order and lower order cognitive capabilities for educational purposes, and
4. When a method or combination of skills should be considered critical thinking

2.3 Development of Critical Thinking Skills in students

Critical thinking is an empirical conceptual method for precisely and passionately conceptualizing, analyzing, applying, and assessing knowledge collected or created as a mentor to measures and reliance through practise, speech, conversation, or otherwise observation. According to Sulaiman, Rahman and Dzulkifi, (2008) Preparing students for critical reasoning is one of the primary priorities for many higher education professionals and is also a prerequisite

for most employers and college graduates. Plato discovered in the debate over 2500 years ago that critical thinking is the instrument that encourages people to find explanations or solutions to uncertainty and the issue of civilization. According to Ornstein and Levine (2006) Plato's teacher Socrates claimed that dialogue and logical thought of expertise exist in the mind of the pupil rather than a teacher who transmits knowledge to students. Critical thinking skills allow learners to think critically and solve challenges in school and day-to-day (NCTM, 2000;Jacob, 2012). According to Soedjadi (2000) & Rohaeti (2010) The approach that relies on memorization information that causes students to consider less critically is the bulk of school teaching and learning. Duplass & Ziedler (2002) The teaching approach focuses on the substances of the subject and lack the growth of students thinking skills. Consequently. According to Zohar & Dori (2003) The undervaluation of cognitive abilities in teaching and learning has an effect on students' ability to thin. The basic important concept of (CT) is according to Facione (2011) is the capacity to perceive, examine, assess, conclude, explain and self regulate. Critical thinking not only describes the ability to think in accordance with the laws of logic and probability, but it also reflects the ability to apply these skills to real-life issues that are not content-independent (Hader, 2005). Therefore, when attempting to grasp something to teach, logical thinking skills are required. Perkins and Murphy (2006) Similarly critical thinking encourages students to use evidence to take advantage of current expertise and facts in order to achieve a fair solution in new circumstances. Paul and Elder (2008) When pupils practice critical thinking, they are not passive, but rather active. According to McGregor (2007) The aim of increasing the capacity to learns in the direction of provide a level of thought that requires the standard of thinking not only in school but also in the community outside of the school. Students need good critical thinking skills to read and write successfully in school and college. Employees must also think

objectively in order to interpret results, choose the best course of action, and act on their decisions. The more analytical thinking is promoted by previous students, the better equipped they would be to do refine, thoughtful research on the problems they face. Learning skills related to the ability of students to grasp the mechanisms of learning while studying the substances of subject (Swartz, 2001). According to McGuinness et al. (2003), (Swartz (2001), Rajendran(2010) Although several other scholars suggest that these talents are blended into school subjects. According to Rajendran (2010) Infusion model based on curriculum in school days is the proposed approach for teaching thinking skill. Swartz (2001) and Butera et al. (2014) also reinforced this thing in schools, which claimed so as to in the sense of subjects a more effective teaching skills is a usual ways intended for educators to teach students that how they can think critically.

2.4 Characteristics of Critical Thinking

In exploring characteristic of critical thinking, there are quite a variety of opinions defining it. Most problem solving models, according to Jacob and Sam (2008) have the following steps of occurrence:

1. Representing problems
2. Searching for solutions and
3. Implementing them.

According to Arends (2009) critical thinking appears to be best encouraged among students when a more consistent emphasis is placed on the discussions, and when instructor facilitation is less frequent but more purposeful. Taking into consideration the complexity of the concept of critical thinking and literature review obviously it is not easy to define critical thinking and there

is not a single definition of critical thinking (Lince, 2016). According to Abrami et al., (2008), there are five methods or approaches that can be used to measure critical thinking skills:

(a) Test Standard,

(b) Teacher Testing and Evaluation,

(c) Test developed by a group of researchers,

(d) Test developed by researchers, and

(e) Measurement of a second source.

According to Rochmad et al (2018) Characteristics of critical thinking as follows: student ensured that the minimum requirements required to answer the questions are met; answered the problems given with the information already owned to find a solution; strengthen the argument by using many examples; made a logical conclusions of the solution of the problem obtained. Strategy phase: student has main objective to poured open thoughts, ideas, and explain openly to a problem. Characteristics of critical thinking: student rephrased the problem in more detail; evaluated the troubleshooting process that has been done; redefined the given problem; reconnected the explanation results with other concepts that may be related; and try to reworked the new information so as to generated problem solutions in several different ways.

According to Bowell and Kemp (2002) If we look at the definitions of critical thinking, We may deduce roughly a general definition of the aspects of human rational thought. Critical thinking persons are individuals who inquire, challenge, dismiss knowledge as it is, trigger, analytically think and synthesize, analyze and explain information on a genuine basis, treat open-minded and thought-conscious basis. When you have the ability to analyze the efforts of others to persuade

people so that you can logically evaluate what they say or write to assess If they are not appointing you in a different way, you will begin to free yourself from believing what others are trying to convince you about without understanding whether you have a legitimate reason to be persuaded. In displaying both the importance of critical thought and critical learner traits, each division, though, is very descriptive and succinct. According to Paul and Elder (2008) have released a list of critical thinkers ' uniqueness. Critical thinker's characteristics list as follows:

- It poses critical questions and issues
- Formulates them specifically and appropriately
- Collects and analyses related data
- Using abstract theories to effectively explain this
- Accomplishes sound assumptions and solutions
- Checking them against acceptable standards and norms
- Think openly inside alternative reasoning systems
- Identifying and testing as acceptable
- Their assumptions and consequences

According to Jain & Patel, (2008) Critical thinking is more than just a collection of facts and information; it is a method of approaching something that actually occupies your mind to draw the best possible inference. Critical thinkers are increasingly focused on developing their comprehension and investing in individual self-learning. Since they can get new self-improving planes, they make some of the best leaders. Cultivate the following 16 attributes of critical thinkers if you are hoping to reach your full potential and make your mark on the world.

1. Observation: It insight deep understanding.

2. Curiosity: It forces to keep open minded and propel to gain knowledge deeply.
3. Objectivity: It shape point of view, life experience and assumption in a way.
4. Introspection: It is art of thinking and change in a creative way.
5. Analytical thinking: It is ability of analyze all the things where it is correct or wrong.
6. Identifying biases: It is challenging to recognize the evidence that shapes their convictions and to determine whether they are true or not.
7. Determining relevance: It is the process of figuring out about what information is most relevant meaningful and considers it importance.
8. Inference: It assesses the information and draw conclusion based on raw material. It is the ability of extrapolate meaning from data and discover important outcomes.
9. Compassion and empathy: it skew perception from situation
10. Humility: It is the ability to accept one's flaws and to correctly consider one's positive attributes.
11. Willing to challenge the status quo: It involves challenging long-established business processes and refusing to follow traditional methods merely because that's how it was always done.
12. Open mindedness: It is step back from a situation and not become entangled in it
13. Aware of common thinking error: It involve logical and reasoning from clouded by illusion and misconceptions.
14. Creative thinking: Its reject standardized format of problem solving and promote creativity that bring out of the box.
15. Effective communicators: It starts with clear thoughts and develop tool to express it.
16. Active listeners: It involve activeness of listening all the things deeply.

2.4.1 Critical Thinking and Perception

Self-directed, automated, self-controlled, and self-corrective thinking should also be important. In an impartial way, critical thought provides the best degree of consistency. Apprentices who are good in being able to think critically constantly try to be compassionate, sensitive and considerate in their lives. As Paul and Elder (2007) said, according to a Socratic theory that life that is not actively lived does not deserve to be lived unconsciously will lead to an unjust and dangerous world.

It is vital for its use to equate critical thinking with cautionary examination, Conceptualization transparency, presentation thoroughness and execution uprightness. According in the direction of Paul and Elder (2006), Critical thinking is described as the process of analyzing and assessing one's own thinking in order to improve it. Critical thinking also helps students to assume that they accept the challenging principles of brilliance and attentive comprehension of how to apply them to morally fulfill their conscience and work. Furthermore it includes organizational interaction and problem-solving skills, including the duty to monitor learners through natural self-centering and socio-centrism. In general, their critical thinking skills did not vary substantially between the male and female classes. Gender has not played a part in developing or deteriorating the capacity to think objectively. In critical thought, gender was not a matter of. There were significant differences between low and high motivation level group in overall critical thinking skill which can indicate that motivational condition had significant effect on testing performance.

2.4.2 Gender and Critical Thinking

In the last few decades, theoretical and empirical investigations have shown that creativity is a substantial and strong influence in personal, academic, and professional success. Despite the fact that those constructs have been studied individually by academics in many domains, only a few comparative studies have focused on the relationships between them.

The relationships between ‘gender and critical thinking’ have not been precisely discovered. Although critical thinking is reported in problems and as active learners to be part of knowledge society. Critical thinking components such as content inference, assumption recognition, deduction of unnecessary actions and elimination of potential biases, interpretation of analytical results, and evaluation of outcomes and arguments are all related to knowledge generation and development. Ghadirian, Salehi and Ayub (2018) explored and focused only learning effectiveness and perceptions of student’s behavioral patterns of knowledge dimensions and cognitive processes for online discussions. The empirical research explores five knowledge dimensions and seven Cognitive Process Dimensions. According to results, students were primarily sharing knowledge dimensions and cognitive processes of meta cognition and understanding. People's behaviours in individual and group settings converge with the form of knowledge (explicit and implicit). In terms of disseminating high-quality material among those stakeholders, knowledge management can take many forms (kulakli & Mahony, 2014). Interactivity, collaborative working, sharing valuable information that requires a large number of user participation, collection of learner insights, intelligence delivery methods, and participation in sharing would generate new valuable knowledge are the most common

impacts on knowledge generation in educational contexts. Analyzing the concept and context allows people to be more creative. People can participate in improving information seeking activities and generating new beneficial results in knowledge acquisition, dissemination, and cognitive processes by analyzing the concept and context. In general, there was no significant difference in critical thinking ability between the male and female groups. Gender did not play a role in the development or decline of critical thinking skills. Gender was unimportant in critical thinking.

2.4.3 Creativity and Critical Thinking

Creativity is recognized in every human being and in every time of human life as a talent that can be observed. But the consistency, improvement, degree and presence of imagination will vary from person to human Creativity has different characteristics: versatility, multiple thought, environmental and human sensitivity, being alert and involved in new circumstances, rationalism, simple and quick thinking and treatment, originality, reaching diverse conclusions (karakoc, 2016). Often, critical thought is referred to as 'critical-creative thinking. It may be seen as the same to think objectively and creatively, but obviously there are essential variations between two types of thought. Creativity is a method of designing or producing, a process of determining or assessing criticality. It is a way to define believes and unwillingness by using evaluating strategy. Using these skills in life is important in this era for producing better product for the society and it can help learners to solve their issues in their practical life.

2.5 Approaches of Critical Thinking

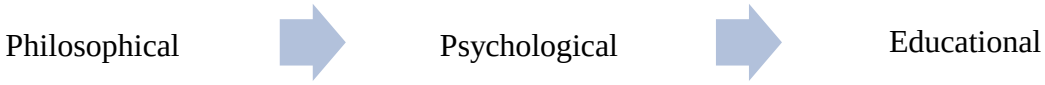

Figure 2.2 Approaches of Critical Thinking

The research on critical thought has two major analytical areas: philosophy and psychology In the education field, Third important branch of thought was also found. These distinct intellectual strands have established different approaches that embody their interests in the concept of critical thought (Lyer, 2019) Each of these methods is discussed below in detail:

These three approaches of critical thinking are valuable and introduced by Lai (2011) and he insight his knowledge unite that is useful to understand the concept of these approaches. The philosophical approach accentuates on the process of logic and describe that critical thinking is the speculation rationale that depend on the kind of perfect intuition. The cognitive approach influence on the result which is come from cognitive thoughts and target on it and sometimes these sequels are perceivable for critical thinker. The educational approach has both philosophical and cognitive elements but it's depending on taxonomies to guide the assessment and how to make result according to understanding that is not well characterized. These approaches are contrast like three schools of thoughts. These approaches are incomplete in one way but they have agreement to work in same area and understanding among these approach.

Critical thinking boosts the creativity and manage the time that you used and it is the ability of thinking according to rules and probability with using these skills in real life to solve problem

(Hader,2005). According to Karakoc (2016) Critical thinking is important for all fields but it is necessary and important for people when they take up their line of work. Paul and Elder (2008) explain the characteristic of critical thinker according to them following characteristics included in the critical thinker. Following characters are incorporated in critical thinker they lift up valuable question and contrive them precisely, they gathered relevant information for interpret the solution effectively, and come to valid conclusion and test these solutions in true criteria with their standards, they think properly with open mind and use according to their need.

According to Kurum (2002) Philosophical approaches have focused on good thinking norms, the concept and motivation of human thought, and the cognitive skills required for an objective world view, whereas psychological approaches have focused on thinking and experimental studies, individual differences in learning thinking, and the concept of problem solving, which is a component of critical thinking. As seen in the preceding section, critical thinking is unquestionably important in all aspects of life, but especially in professions that deal with people.

Thinking critically is the cognitive skill that is used to diagnose and spot the issue with thoughtful process and it intercede to evaluate with honesty and come to conceivable clarification. And this process is cultivated for interpreting and dealing with the issue. Critical thinking ability help to employ to think with their awareness and understanding using their own though process to come on best point to revel their method for their task which are assign by the others or institute. Basically it's empower employ to depends on their own accepted wisdom. Critical thinking is most important direction is to build power to make own decision by using their own thinking abilities. Student cannot think properly, if they use Meta cognition they will make their own decision otherwise it will difficult for them to understand the effectiveness of

their own thinking abilities. Meta cognition work as central point of thinking abilities that understand the aspects with their strategies, It helps student to decide that the strategy they used in their learning style is effectual for them. It is supportive and constructive side of critical thinking because due to this tool it allows us to that how can we formulate and make decision with their recent information (Bruning, Schraw, Norby, & Ronning 2004).

According to Hove (2011) critical thinking skills are essential for one and all and these skills are developed through scaffolding approach for example if we learn and teach anything we also know about the prior knowledge about that things. Senechal (2010) mastery of any basic skill is beginning of that education or skill so we can never say that we have all skills. Questions answers are the best approach to improve and develop thinking skills in students so if you educators want that their students to teach these skills they use question answer types of approach in the class to enhance their thinking skills, and this strategy of using basic thinking skill build their critical thinking thoughts at upper level and these skills encompasses the chain of command.

Mendelman (2007) stated that educators must use scaffolding skills to prepare their student to use critical thinking skill. According to Pescatore (2007) if students think critically they easily analyze the message and come to the effective conclusion through comparing with their new knowledge and enlarge their knowledge.

2.5.1 The Philosophical Approach of Critical Thinking

According to Thayer-Bacon, (2000) Socrates, Plato, also the works of Aristotle, and more recently, the philosophical approach explained by Matthew Lipman and Richard Paul. Philosophical theories are logic and opinion theories about understanding issues, i.e. what

a person requires in order to think. Socrates' exploratory dialogues linked critical thinking to philosophy. He aided others in thinking about themselves and gaining information in this way. Critical thinking, in his opinion, entails discovering the truth. People have an unstable and tumultuous awareness of unproven ideas and assumptions as a result of Socrates' debate. People become upset and agitated when they recognize themselves. This is perplexity, as well as knowledge of their stupidity and ignorance (Neistani, 2011). Following Socrates, Plato and later Aristotle pursued their studies of thought and understanding. Humans are discovering knowledge, according to Plato, whereas intellectual talent is one of the most essential characteristics of people, according to Aristotle. Emotional life, in his opinion, serves as a springboard for intellectual development. The current reform movement in the United States. Bailin (2002) stated in the tradition of philosophy, those who work frequently emphasize ideals or concepts of thinking. Critical thinking is characterized as a result of a certain standard, basically positive reasoning that satisfies a set of requirements norms of quality and suitability. Informal logic, which was a distinct discipline of philosophy in the early 1970s, is strongly linked to the educational system. Informal logic is a branch of logic concerned with language analysis, testing, and error investigation. Critical thinking, according to informal logicians, is a broader articulation that encompasses informal logic results while also benefiting other forms of logic (Jhonson, 2007). According to Facione, (2000)"critical thinking is considering what to do or believe in a reflective way." All of these philosophical notions emphasize thinking's formal requirements. Facione (1998) also based his critical thinking approach on a philosophical concept. He wanted to discover how critical thinking is defined at various academic levels. There are six critical

thinking skills in Facione's model: 1) interpretation; 2) analysis; 3) Testing; 4) inference; 5) Explanation; and 6) self regulation. Lipman (2003) stated that Critical thinking is one type of reflective thinking that is thought to assist people in making quick and accurate judgments. Critical thinking, in his opinion, is linked to cognitive development and intellectual responsibility. He also considered that one of the most crucial aspects of critical thinking is self-correction. Interests and trends, he believes, play an important part in critical thinking. Reading, writing, arithmetic, and verbal communication are vital in the development of social skills, but they are insufficient for critical thinking.

2.5.2 The Psychological Approach of critical thinking

The cognitive approach to thought conflicts with the metaphysical view in two ways. According to Norishma (2011) There are three parts of critical thinking: 1) post components, 2) performance components, and 3) knowledge components. Post components are executive intelligence components that are employed in design. Performance components aid in the implementation of post-component instruction. They are the intelligence's executive branch. The ability to understand and use language is one of the components of attaining knowledge. As a result, they assist people in using signs to solve issues and learn new knowledge. Everyone must recognize the nature of problems, attempt to solve them, produce a design, and test its messages and feedback, according to these critical thinking components. Philosophers emphasize critical thinking attitudes, whereas psychologists emphasize critical thinking skills. As a result, educational psychologists agree that learners' beliefs should be challenged, but this cannot be done without critical thinking abilities. In numerous fields, most cognitive psychologists stress evaluating cognitive schemata among novices and professionals. The structure of

cognitive skills has been studied, and it shows how the problem-solving process evolves as knowledge and experiences increase. Critical thinking skills are emphasised by psychologists (Atabaki , Keshtiaray & Yarmohammadian, 2015). Bailin (2002) for instance, suggests that treating logical thought in the order of independent interventions and abilities is a fundamental misunderstanding, and that this misunderstanding stems from the need for behaviorists to describe concepts in forms which can be clearly tested. Because the actual thought process is not measurable, behavioral scientists have tended to focus on the stimulate. Some thinkers have warned against comparing Behavior in critical thought and its component skills. TiM Van Gelder, (2005) stated thar critical thought is more than just the sum of its parts , arguing Nevertheless, some adherents of The philosophical tradition has stressed that without reflective thought, it is necessary to merely "go through the motions" or go through the important "steps" (Bailin, 2002). According to Willingham, (2007) "Being open to new information that disconfirms your theories on both sides of the issue, thinking dispassionately, requiring that arguments be backed up by evidence, deducting and inferring conclusions from the facts available, solving problems, and so on."

2.5.3 The Educational Approach of Critical Thinking

Finally, many people involved in the world of education often took part in debates regarding thought about critical. There has always been a school of thought that believes that the development of a child's thinking should be the primary goal of schools, rather than an afterthought - if it happens at all (Lipman, 2003). Education is the process of human development, and it is possibly the most fundamental necessity for people. Emir (2009) Qualified education should show students the route in terms of what to study and

how to learn it. Students demonstrate their critical thinking talents when they analyze what they have learnt and how they have learned it. One of the goals of education should be to develop students' thinking and motor skills, which is a basic goal of contemporary educational techniques. According to Elder & Paul (2008), when students practice critical thinking, they are not passive but rather active means they can learn critical thinking skills through practice. Lyer (2019) stated that One of the most essential goals of education is to generate well-informed learners, which means that students should be able to comprehend important, helpful, beautiful, and powerful ideas. Another goal is to develop learners who are eager to think critically and analytically, to apply what they've learned to improve their own lives and to contribute to society culture and civilization. These two goals for education as a platform for promoting critical thinking are predicated on several assumptions.

1. The brain is a biological organ. Minds are built. As a result, curriculum is a mind-altering technology. This emphasizes the moral imperative of seeing students as self-contained centers of consciousness with the intrinsic power to shape their own minds and lives.
2. Rather than preparing students into preconceived roles, education should aim to educate them for self-direction. As a result, learners must be prepared to think their way through the maze of problems that life will throw at them on their own.
3. The novice is usually inducted into the forms-of-representation and realms of meaning that humans have constructed thus far through education systems.
4. To democracy and democratic life, careful analysis, clear thinking, and reasoned deliberation are essential.

2.6 Practicing of Critical Thinking

Rolf (2004) conducted a research study to find out the answer to whether children can be made as creative and analytical. The aims of these study studies were to find ways to allow children in the sense of the classroom to use their feelings, their brains, create ties / relationships / references, make strategies and decisions. The results are also that the thinking and communication abilities of students could be strengthened if teachers rely on meta cognitive skills while implementing their teaching in their classroom environments. Conversely, on the other hand, it is observed that learners may not need to be taught / trained as a natural method of critical thinking (Sternberg & Williams, 2009). Duron, Limbackh and Waugh (2006) said that it was found that while it is a common procedure, it should not be left to a student because it increases the likelihood of prejudice, inaccurate, subconscious and possible bias. The excellent, however, can be taught, but Black (2005) showed the findings that if they just read, students would improve their reasoning ability. According to Astin, (19930, Gellin, (2003), Stedman and Adams, (2012) stated in their researches identified has been a primary source of priority in the institutes like colleges and universities to improve critical thinking capabilities required for success outside the classroom. In a sample of 433 higher learning institutions, 95 percent of the chief Critical thinking was described by academic officers as one of the most valuable qualities for students and 81% of employers wanted colleges to spend further on learning critical thinking skills (AAC&U, 2011). According to Paul, Elder and Bartell, (1997), Lauer, (2005), Shim and Walczak, (2012), Ahuna et al., (2014), Critical thinking development is widely accepted as an important educational goal, there is evidence so many colleges teacher do not fully understand how to teach critical thinking effectively or learn cognitive skills of a higher order and are hesitant to incorporate critical thinking exercises into course curricula. According to Duron,

Limback, and Waugh, (2006), Ahuna et al., (2014), stated that all college teacher and faculty claim to inspire learners, to improve critical thinking and higher-order cognitive skills but use a teaching style to concentrate on memory and lower-level cognitive abilities activities that aren't conducive to critical thinking. In a literature review presented by Beyer (2001) showed that many high school and college students lack the critical thinking skills needed to succeed in post-secondary education or certain occupations. Although common psychological capacity, as well as(CT), is the one of most excellent long term workplace predictors, performance, several additional aspect decide achievement in a complex system that varies with each situation, such as commitment, trust, and time management skills (Rode, Arthaud-Day, Mooney, Close & Baldwin, 2008)

Section 2 is Based on Model Related to Research area

Theories and Model of Critical Thinking

A theory is a broad statements that attempts to explain phenomena. A model, on the other hand, is a deliberate depiction of reality. A model is frequently used to explain an application of a theory for a specific instance, which is another method to connect the two and highlight differences. All the theories which were added are background of the study with the background we can relate

2.7 Fundamental Elements of Critical Thinking Skills

The capacity to proceed knowledge and/or provide ideas by experiencing some sequences of seeing, comprehending, analyzing, and synthesizing is referred to as critical thinking capability (Rubin,2019). Obispo (2016) defined critical thinking as a talent that comprises certain essential components such as reasoning, evaluating, problem solving, analyzing, and decision making.

Those aspects are indispensible in shaping a great and comprehensive critical thinking talent, which necessitated the willingness of both students and teachers to collaborate. In reality, critical thinking ability has a major impact on one's self-reflection or self-evaluation. Significantly, critical thinking capacity supports one's performance in both academic and non-academic settings since it adds to the ability of reflective and autonomous thinking, and most importantly, it fosters creativity (Lam, 2011). Furthermore, Rubin (2019) noted that, while critical thinking is more difficult among ESL/EFL students because they must face communications in different languages, it may enhance students' involvement in the topic and can be practiced abilities and proficiency levels.

Figure 2.3 Critical Thinking skill Elements Obispo (2016)

According to the diagram above, in order to reach the last stages of critical thinking skills, students should join a work team or at the very least learn those elements on their own. Furthermore, critical thinking skills do not develop spontaneously or without effort; pupils must be exposed to planned, purposeful, and repetitive exposure and practice in order to build insightful thinking (Changwong, Sukkamart, and sisan,2018). The pupils were placed in a

difficult instructional scenario in which they had to work in a group and on a tight schedule. Those circumstances may inspire students to engage in a series of critical thinking activities, such as monitoring the recording place, analyzing the script's concept, and synthesizing the information gained from either the contributor, teachers' criticism, or the team's perspective.

2.8 ACER CRITICAL THINKING SKILL DEVELOPMENT FRAMEWORK

Critical thinking is described by the Heard, Scoular, Duckworth & Teo (2020) critical thinking skill development framework as strands (fundamental elements) that are then further qualified as facets (sub elements). A strand is the overarching conceptual category used to frame the abilities and information covered by critical thinking exams, whereas an aspect is a specific subject category inside a strand. The framework is divided into three strands, each of which contains three aspects.

2.8.1 Standard 1. Knowledge conclusion divided into

Aspect 1 Identifies gaps in knowledge

Aspect 2 Discriminates amongst information

Aspect 3 Identifies patterns and makes connections

The kind of thoughtful and evaluative engagement with information that is required to make accurate sense of it is referred to as knowledge creation. It entails determining what we know and need to know, as well as what knowledge appears reasonable, helpful, and trustworthy, and how best to organize it in order to gain explanatory sense and meaning from it. It entails examining and evaluating what one already knows, as well as acknowledging that one may not have all of the necessary information (Bent & Stubbings, 2011), or that one may be functioning under certain misconceptions. Posing questions to inspire additional exploration and inquiry can

be a way of acknowledging apparent inadequacies in one's own understanding (Ennis, 2018). It must be analyzed through the use of criteria in order to think critically about its content. (Paul & Elder, 2007; Grafstein, 2017). On the basis of generalizations gained from them, this frequently leads to the formation of provisional ‘rules' or theories via induction to best explain these patterns (Ennis, 2018). It also entails recognizing exceptions and counter-examples, as well as determining their importance.

2.8.2 Standard 2. Evaluating Reasoning divided into

Aspect 1 Applies Logic

Aspect 2 Identifies assumptions and motivations

Aspect 3 Justifies Arguments

Reasoning can take many different forms, including verbal, spatial, abstract, numerical, mechanical, computational, and graphical representations. A number of reasoning representations may be present when working in sophisticated problem-solving scenarios. It can also be used to make reasonable predictions about what an argument or set of conditions means – or whether they are still valid – in a different context (i.e. beyond the parameters of a particular argument or set of circumstances) (Ong et el., 2018).

2.8.3 Standard 3. Decision Making divided into

Aspect 1 Identifies criteria for decision-making

Aspect 2 Evaluates options

Aspect 3 Tests and monitors implementation

While similar to problem-solving, decision-making differs in that it only necessitates the analytical and evaluative parts of problem-solving, rather than the generating or creative aspects, thus fitting more neatly within a critical thinking framework. It entails determining how effectively various solutions will meet the demands of a certain issue or problem while remaining within the restrictions set by the situation (Jimenez-Aleixandre & Puig, 2012).

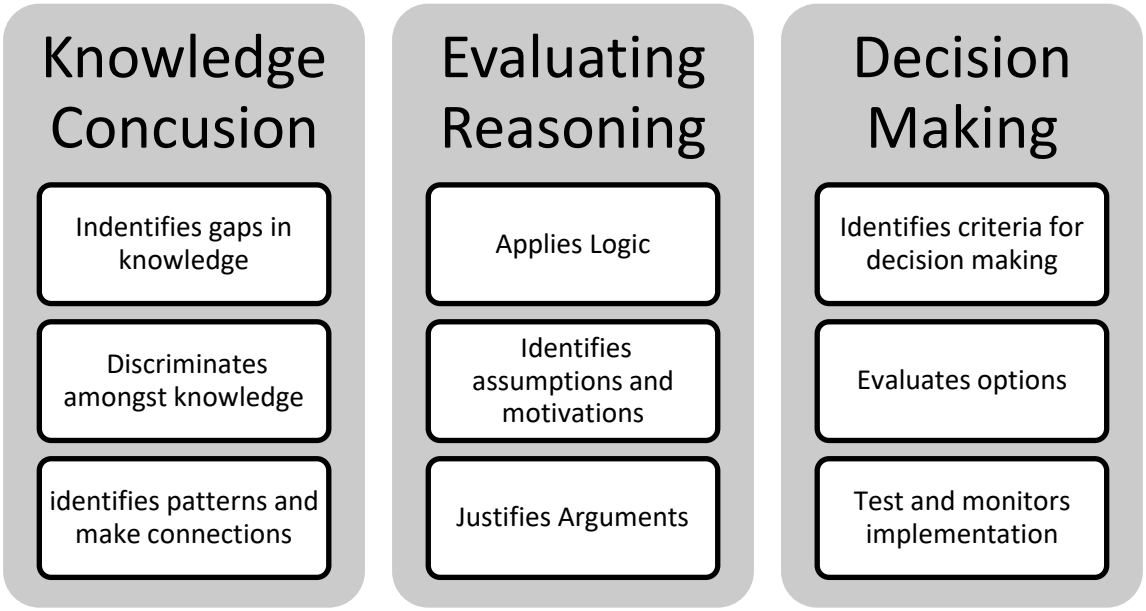

Figure 2.4 Critical thinking skill development framework Head et.al (2020*)*

2.9 Step Model

A step method was developed by Duron, Limbach, Waugh (2006) to inspire students towards critical thinking. It's been the following

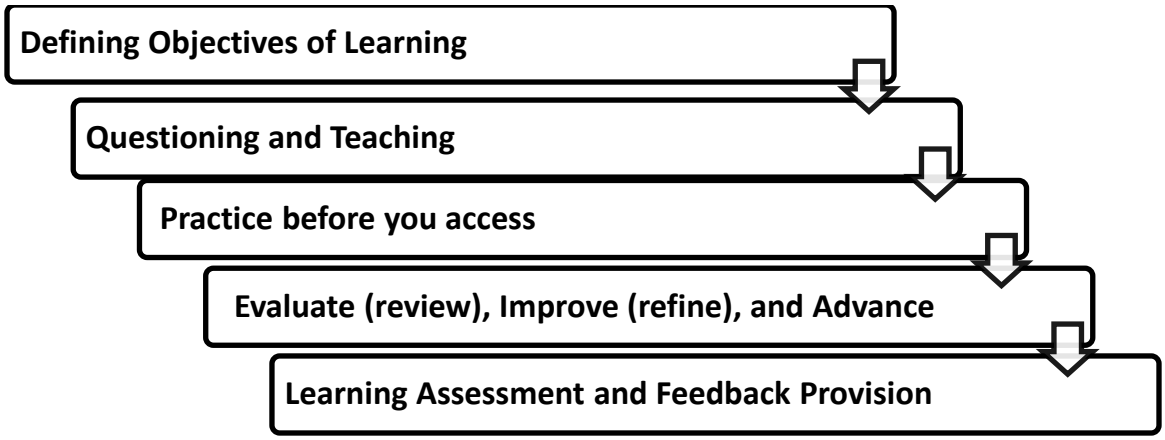

Figure 2.5 Step Model by Duron, Limbach, Waugh (2006)

2.9.1 Defining Objectives of Learning

"Bearing with in the mind through the value of the lessons, it is the position in the instructional curriculum plus the function it performs in communicating information base, knowing and respecting the need for their students to identify, prepare and set learning targets, which may also assist them in identifying what their students' behaviours are vulnerable to when they leave their classrooms. Aims of the learning methods, activities, tests that correspond to the effective critical reasoning skills of those of higher levels of taxonomy given by (Bloom, 1956)

2.9.2 Questioning and Teaching

Ask questions that really encourage teachers to begin from the established data point is an important aspect of teaching methodology by moving towards the development and creation of new ideas, ideas, concepts and reflections.

2.9.3 Practice before you access

Active learning as Bonwell and Eison (1991) identified it. It announced that it could include students in the activities that could result in their acts being analyzed. Accorfing to Fink (2003), the idea of dynamic education that could help research and thoughtfulness actually leads to more awareness among the learners and their retention ship and they're not idle or passive in their preparation. It was further suggested that two formal and centered norms should be included in the practices of student learning.

a) Three active education components are data, ideas, thoughts, practice and perspective.

b) It is important to use oriented types of learning activities. It offers students the opportunity to recreate themselves and also discussion in a class or in the diary with others. Students should answer questions related to their education in reflective writing, such as what it is, its quality, its methodology, whether more is needed, and what teachers interpret for the conduct needed in the classrooms according to (Fink, 2003).

2.9.4 Evaluate (review), Improve (refine), and Advance

In order to retain them and to help students improve critical thinking abilities, teaching would strive to advance their teaching methods. There are several ways to collect the key evidence/realities related to learning and answers given by students to the teaching approaches implemented by their teachers (Angelo and Cross, 1993).

2.9.5 Learning Assessment and Feedback Provision

It is necessary to assess, compare students ' work with their performance according to preset standards and values provided by the teacher as a feedback. Wlodkowski and

Ginsberg (1995) argued that teachers must always provide their assessment to inform students of their shortcomings or abilities, rather than just the same old standards, productive, measurable, fast, Optimistic, personal and special.

2.10 Cognitive Theories

Children's cognitive development has long been researched in a variety of ways. The most important and well-known theory is Jean Piaget's influential theory (1896- 1980). People, according to Piaget, have an inbuilt desire to understand how the world works and to achieve order and predictability in their lives. The urge for equilibrium, or a condition of balance, is the name given to this demand. It is a foundational concept in Piaget's theory. As the balance shifts due to new experiences, so does one's way of thinking. According to this theory child pass for stages. In 1856 Bloom 1956 demonstrates higher level of analytical capacity and it requires critical thinking as a piece of analysis, mixing (synthesizing) and evaluation of cognition-related skills (lower levels) as intelligence, comprehension, application addressing the need for based memory and information usage (Duron et al. 2006).

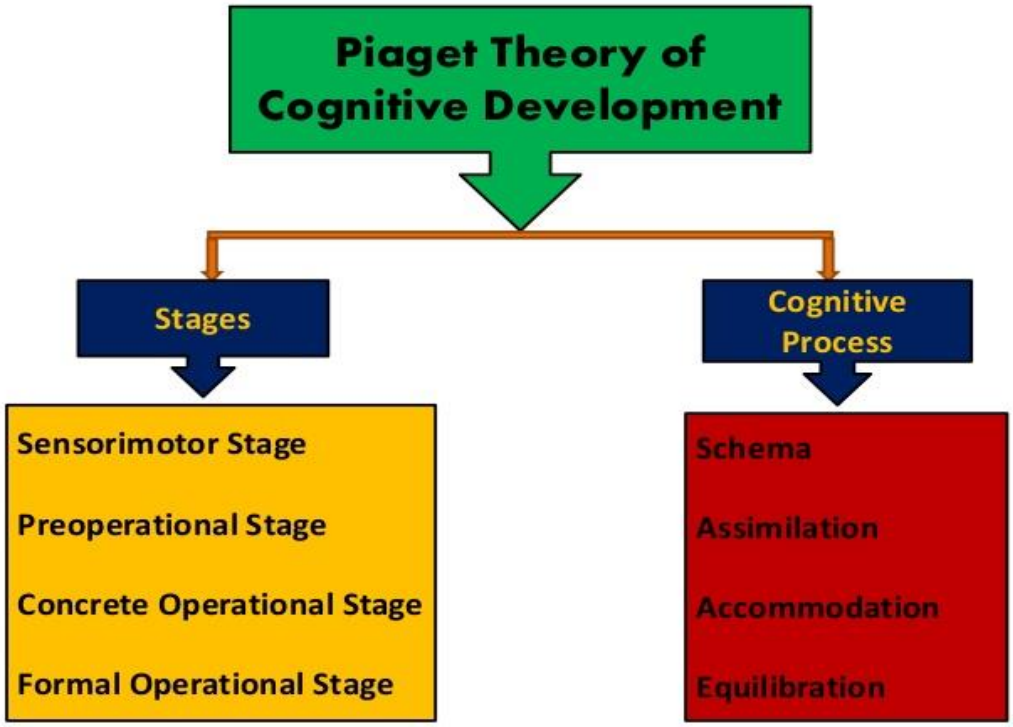

Figure 2.6 Piaget Theory of Cognitive Development (1896-1880)

2.11. Bloom Taxonomy Revised model of critical thinking

According to Anderson & Krathwohl (2001) The current critical thinking development model utilizes a six-stage model based on the taxonomy model of the 21st Century. The model directs the work of students through six stages of critical thinking:

Stage number 1 Remembering,

Stage number 2 Understanding,

Stage number 3 Applying,

Stage number 4 Analyzing,

Stage number 5 Evaluating and

Stage number 6 Creating.

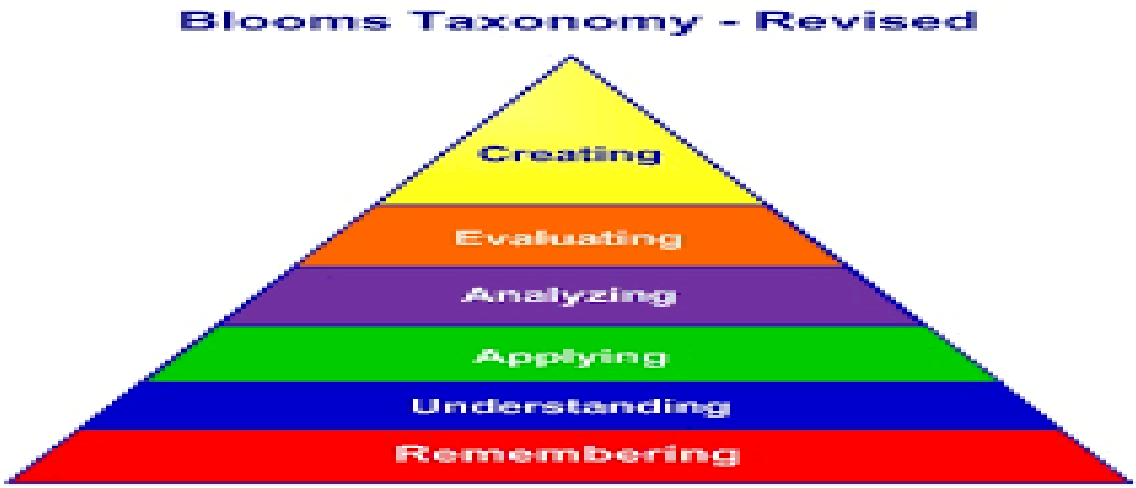

Figure 2.7. Revised Bloom Taxonomy Anderson & Krathwohl (2001)

According to Zapalska, McCarty, McLear and White (2018) in this stage of **Remembering** the principles, theories, times, events, locations, facts, topics, core thoughts, graphs and diagrams must be recalled by students. They are supposed to consider emerging ideas, models, diagrams, and calculations before the theoretical method starts. The phase of logical thought will not continue further without memorization. By being asked to remember memorized details, data, words, formulas, and concepts used in the assignment, students are presented with some instructions. According to Zapalska, Mccarty & McLear (2018) **Understanding** is the most crucial level, as students need to have appropriate comprehension of the principles to be productive in the entire process. Entire method of studying. An significant step, which reflects deep learning and the participation of the student in the critical thought process, is a clear comprehension of the subject. In order to achieve comprehension and complete the task, students was important to remember, describe and interpret concepts outlined in the course's basic theories. They must discover the significance of terms, descriptions or calculations, explain facts,

infer cause and effect, and translate philosophy into functional concepts in order to promote the comprehension and analysis of concepts. In this way, the method of analysis creates a relation between the theories and they have been delivered to life or reality outside of the school world in a textbook or in the classroom and are supposed to evolve within the report or mission. According to Dunegan (2011) In the stage of **Applying** In a new scenario, students are required to apply information, solve issues using what they have memorized, and understand. They can be assisted by asking them questions that direct them through the process and by defining the known and unknown elements of the problem, structuring these elements according to a known model, and selecting a system or theory that encourages them to use the method to solve the problem or apply particular principle. As it is challenging for most students to apply the theory to real life problems, the instructor must help students apply the theory and data to a particular problem. Therefore, simple and unambiguous directions that serve like a checklist must be issued to students. According Forehand (2005) In the stage of **Analyzing** A single theory or body of information is supposed to be pulled apart by students. It is advised to use questions that concentrate on splitting the whole into parts, defining the relationships between these parts and disclosing the theoretical concepts. In order to analyze the content and detect relationships between various ideas and components of the project, students understand, describe patterns and significance, see sections and the whole image of concepts and hypotheses. This theoretical method is fundamental to logical thought as it allows learners to gain an understanding of the context and expectations under which particular hypotheses work. Students are expected to articulate themselves freely and to think. Teachers should ask questions to generate personal responses, beliefs, and opinions and to demonstrate a sense of artistic play, using data that students have. According to Adam (2015) In the stage of **Evaluating** Students are encouraged to

use their analytical thinking by answering questions that allow them to judge and display expertise to test concepts to which they have been exposed or operating. They will also make proposals, analyze principles, make conclusions, and criticize ideas. This process gives students first-hand experience in determining the inherent problems that exist when applying theory in a real-world setting. Students come to the realization that theory and reality will never be perfectly superimposed by encountering a range of issues and working to solve them. The work of students is supposed to show that it can be sufficient to draw relations between theory and real life problems to achieve practical results. According to Ferguson (2002) In the stage of **Creating** In this process, students are prepared to apply their comprehension of concepts and ideas creatively. Creating involves creating something new that can be done by breaching agreed expectations and applying ideas in the imaginary scenario and seeking alternatives to planned learning activities.

2.12 Paul-Elder Model of Critical Thinking

According to the Paul and Elder (2001) Critical thinking is the way with the thought through which the philosopher enhances their consistency about any subject, content, or problem, by competently taking care of the frameworks intrinsic in thought and applying analytical standards to them.

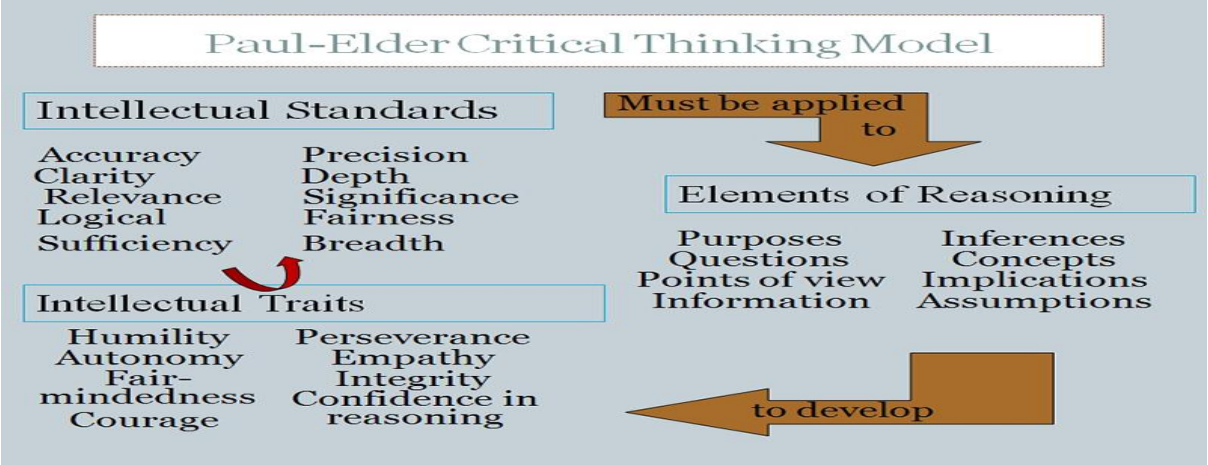

Figure 2.8 Paul and Elder Model

Paul model has three components.

1. Elements of Though
2. Intellectual Standards
3. Intellectual Traits

According to Paul and Elder (2001) The following are the "parts" or elements of thinking reasoning.

1. There is a meaning behind all logic (purpose).
2. Everything logic is an endeavor to find out something, to answer a question, to solve a dilemma. (questions).
3. The logic is all based on assumptions. (assumptions)
4. Every logic are complete for a number of perspective. (point of view)
5. every part of logics are based on facts, evidence and proof. (information)
6. All logics are articulated by ideas and ideas, and influenced by them. (concept)
7. Both reasoning requires inferences or assumptions from which we draw conclusions and assign sense to facts. (inference)

8. Every logic leads anywhere or has consequences and interpretations. (implications)

According to Paul and Elder (2006) to assess the consistency of logic, the intellectual principles that are correlated with these components are used. Strong critical thinking demands that these criteria be regulated. The main aim is to infuse logic principles into all thought so that they become the guide to better and better reasoning. The principles of intellectual comprise:

- Accuracy
- Clarity
- Relevance
- Logical
- Sufficiency
- Precision
- Depth
- Significance
- Fairness
- Breadth

According to Paul and Elder (2010) Consistent application of reasoning principles to the elements of thought results in the development of intellectual characteristics such as:

1. Intellectual Humility
2. Intellectual Courage
3. Intellectual Empathy
4. Intellectual Autonomy
5. Intellectual Integrity

6. Intellectual Perseverance

7. Confidence in Reason

8. Fair-mindedness

2.13 Researches Related to Critical Thinking

Developing an agreement on what critical thinking is as it relates to state and federal education departments' curriculum and standards, as well as how a teacher defines it according to a rubric, might be astronomically different. Krupat et al. (2011) wanted to know how students in medical school define and use critical thinking. They set out to achieve three distinct objectives. The first was to determine the boundaries by which critical thinking was defined. It is necessary to have a standard definition of critical thinking and how it will be defined according to the work, assignment, or challenge assigned in order to measure it. Even a rubric, which sets expectations for students, might be interpreted differently by educators who have different conceptions of what critical thinking is and how it pertains to their class. There is no way to effectively develop, build, or increase critical thinking skills without a complete understanding of what is expected and how it will be judged. Papinczak et al. (2009) study was from the vantage point of the student. The study was inspired by the tutors' delivery approach and how the students reacted to it. It was revealed that when tutors failed to follow the established guidelines, learning ceased and any attempt to improve critical thinking skills was abandoned. This study revealed that when tutors assessed their delivery methods, many of which were dominant, they were able to ratchet it back to the required level, allowing critical thinking abilities to thrive. Learning expectations decline when there is a lack of consistency, whereas experiences establish and lay the groundwork for students' preconceived beliefs and expectations when working with educators. By doing a quantitative study on comprehending the term critical and what it means to answer

critical questions, Baez (2007) was able to get a new level of understanding in the pursuit of critical thinking. The term critical has come to mean more than just passing judgment on something. As with any research, it is vulnerable to interpretation, and Baez's (2007) study exemplifies this reality about the complexity of research. It's nearly impossible for a research team to even begin to interpret what it implies in general terms to a specific sector or academic subject without a clear explanation of what's being researched or expected. Breaking down the research into a central term, such as critical thinking, and what is to be accurately measured, such as the development of critical thinking skills, allows for the beginning of understanding the implications; on the other hand, Stage (2007) claims that answering the critical questions pushes the boundaries of what is customary. In the analysis, the relationship between freedom, logical thought and perception of Iranian EFL Learners is discussed (Sheik Behdani, 2009). The study findings showed that the A survey of critical thinking attitudes conducted by Stapletion (2011) among elementary school teachers in Hong Kong where 72 high school teachers be surveyed. The researcher then asked the teachers about their ideas and logical thought concepts, and it was discovered that when they were little understanding of what is critical thinking, they did have some understanding of it. learner's ability to think objectively and the ability to understand each other is related. It also suggested that logical thinking learners are individually studying they can stand on their own because they are self-sufficient, and they are well connected to one another.

The research were focused on the schoolwork of critical thinking capacity, the endurance and the ability to read texts relevant to vocabulary items not known to the learners. Kamali and Fahim (2011) conducted the study. The study's t-test results showed that the critical thinking and durability of the ability to read unfamiliar objects had a significant impact on related words.

The study was conducted by Barnawi (2011) to examine and explore the full impact of on English as a foreground language at college level, critical thought and self-speaking. The researcher tried to suggest some education-related task, i.e. writing that was compelling and organizing a class in writing to develop clear thinking skills. He argued that it could provide an opportunity for students to work with an independent mind and express their opinions in their essays by using critical thinking skills in language learning. In addition, by further evaluating the relationship that is logical and substantive in their statements, this may also help the learners to produce outcomes.

Stapletion (2011) published a study of attitudes to critical thought by in Hong Kong, where 72 high school teachers were polled and it was discovered that they had little understanding of what is critical thinking, they did have some understanding of it But there was a lack of in-depth knowledge and practice of critical thinking. In contrast, they have promoted critical thinking to become an essential part of their curriculum.

There are a variety of exams and measures for critical thought. This also covers the Facione (1990) California Critical Thinking Skills Assessment. More Cornell Critical Thinking Studies by (Ennisand Millman 2005).

Genuine techniques for emulation are also vital for quantifying higher-order skills, as recent critical thinking assessment approaches using set-up items have been developed by b Silva (2008).

Boylan's (2002 pose the right questions and note that there is a way for powers to be articulated to clarify the underlying position and views of the problem. In contrast, the process of using

constructed, clear arguments, specific examples and a brief overview on the causes of feelings, views and assumptions were also provided.

2.14 Summary

In the conclusion it is obvious from the literature review that this was a gender based comparative study related to critical thinking skills among university students. All the literature was reviewed on critical thinking skill among students. The literature review was based on the background and history of critical thinking and then also some description about what is critical thinking, than reviewed some definition regarding critical thinking were discussed. Researcher viewed a lot of researcher regarding the importance of critical thinking skills and how these skills were enhanced. Researcher also discussed the three approaches of critical thinking and its use in educational purpose. As it is a gender based study so researcher also gave the background regarding it too. All the literature are reviewed regarding the objectives too and researcher also discussed some researcher regarding critical thinking skills and also mentioned some theories regarding importance and developing of critical thinking skills among students. As literature shows that critical thinking skills are main focus of teacher to developed in the learners from the 6^{th} century and critical thinking skills are developed in students by the help of teacher and their educational experience. Teaching approaches are very important in developing critical thinking skills in students. Researcher also found and observed during gathering some information about critical thinking skills difference level between genders. Some of studies indicated that male learners had solve their issues effectively by using critical thinking skills and in some studies it is found that female learners demonstrate the ideas very well by using critical thinking skills and in some researcher showed that there is no difference found on the basis of gender. After keeping in view and over viewed on the literature researcher also find some gaps and found that from

centuries different scientists and teacher were focused on developing critical thinking skills among students through teachings. It is found after reviewed of literature that critical thinking skills are on the different level between students on the basis of gender. Researcher also found that mostly studies were conducted on international level regarding the practices of critical thinking skills and In Pakistan there were researcher regarding critical thinking skills with different variable even gender based comparison was missing in these researches. Due to the limited sources researcher did not found any research regarding the practices of critical thinking skills among university level. So researcher wanted to conduct a study in Pakistan context to gender based comparative study of critical thinking skills among university students and to find out the practices of critical thinking skills among student because enhancing critical thinking skills at that level will last level so its necessary to assess that are they practicing these skill at university level. Researcher also did not found any gender based comparison regarding critical thinking skills so researcher main focused was to compare critical thinking skills among students on the basis of gender. Researcher conducted this study because there were a lot of confusion found regarding the gender critical thinking skills superiority. So as developing critical thinking skills are very important to develop at all level and used of thinking critically is necessary in these days.

CHAPTER 3

METHODS AND PROCEDURES

This chapter describes how this research was conducted. The study methodology was presented in this section of the chapter, where the progress of the research was discussed in detailed. The research method, population, sampling procedure, sample, data collection tool, data collection, validity, reliability and data analysis were discussed in this chapter.

3.1 Research Approach

The research main aim was to explore the practices of (CT) skills among university students and to compare gender-based critical thinking skills among university students. In this research both objectives need quantitative data and its statistical interpretation. That's why the quantitative approach was chosen for the current study. In this research the researcher was using the questionnaire for data collection. The maximum sample size representative of the population was used to determine the result. Furthermore The study's objectives and hypothesis were also clearly established by the researcher. Before collecting data, all aspects of the situation must be considered analysis were profoundly constructed by the researcher. In this way the entire approach was developed at the proposal writing stage. The collected data were presented in the form of numbers and figures which were organized in figure, charts and graphs. For the quantitative data collection, the researchers constructed the questionnaire in a standardized form so this was the reason for choosing this approach. With the help of the questionnaire, the

researcher gathered answers from the respondents. Researcher used a self developed questionnaire as tool for data collection which was consisted of two parts; Demographics and Critical thinking skills. The demographics part was considered on gender, grade/level and last exams percentage while respondents' level of critical thinking skills was measured through the self-developed questionnaire based on critical thinking skills Domain. Critical thinking skill domains were presented by Elena, Rave, Gabriel, Monsalve, Andrés, Botero & Brand (2017). Total items were 76 and it was consisted of 5 sub scales that were Interpretation, Analysis, Argumentation, Evaluation, and Inference. A five-point Likert scale was used to score the items. From Strongly Disagree to Strongly Agree the responses were coded and evaluated to draw the study's conclusions with the help of the statistical test.

3.2 Research Design

Furthermore, researcher used comparative research design because in this research there were two group from which researcher gather the data for the purpose of data collection. In this Research there were two main objectives one was to explore the practices related to (CT) skills amongst university students and second was to compare the (CT) skills among university students on the basis of gender and researcher compared critical thinking skills of male and female students at university level.

3.3 Overview of Research Objectives

Objectives are the foundation for study without defining the objectives researcher was unable to achieve. Objective is the foundation or structure for the research analysis. Researched developed two main objectives. The research objectives were as following under:

3.3.1 Objective No.1 To explore the practices related to critical thinking skills among university students.

In objective No.1, researcher explored this objective from the different article. The Researcher observed that practices of critical thinking skills were very important among university students. university level is the last level where students can developed their critical thinking skills so that's why researcher explore the students practices related to critical thinking skills among university students and researcher also identified that were student practiced their skills in university.

3.3.2 Objective No.2 To compare the critical thinking skills among university students on the basis of gender.

The objective No. 2, was to further categorize into five sub-objectives, which were as follows

2.a. To compare the interpretation skills among university students on the basis of gender.

2.b. To compare the analysis skills among university students on the basis of gender.

2.c. To compare the argumentation skills among university students on the basis of gender.

2.d. To compare the evaluation skills among university students on the basis of gender.

2.e. To compare the inference skills among university students on the basis of gender.

The purpose of the research was to explore the practices related to critical thing skills among university level because this the last level student can develop and learn these skills and use these skills in their daily life and also compare the critical thinking skills on the basis of gender. So that's why researcher chooses Critical thinking skills domain that were present by Elena, Rave,

Gabriel, Monsalve, Andrés, Botero& Brand (2017). They divided these skills in 5 sub variables that are Interpretation, Analysis, Argumentation, Evaluation, and Inference. Research compares these critical thinking skills among university students.

3.4 Population

Population of the research included all the students (Male and Female) studying in social science department of Islamabad public universities. The study aimed to explore and compare the critical thinking skill among university on the basis of gender. So for that purpose the current study population were male and female students enrolled in the department of social sciences (session 2019 fall) of public sector universities in Islamabad. The total number of students enrolled in the social sciences department at Islamabad's public universities were 8659 among those 4795 students were male and 3864 female students (See Appendix G). According to the Higher Education Commission (HEC), Islamabad has a total of 15 public universities (See Appendix H).While11 out of 15 public universities were offering social science subject.

3.5 Sampling Technique

The primary purpose of sampling is to select the respondent from which the researcher wanted to obtain data. In the researches when population sizes are larger and it is difficult for the researcher to collect the data from whole population when sample make it easier for researcher. Thus keeping in view the nature of research and large population, The proportionate stratified sampling technique was used and applied for the purpose of collecting data for the research. Whenever stratified population is used. Population is divided into two strata, keeping in mind the essence of the study. Population involved in this study were two major groups of (male and

female) students. Researcher picked equal Percentage from each strata depending on the size of each strata.

The main purpose of stratified sampling is to give appropriate share to each stratum. The stratified sampling has two types proportional and disproportionate. In the proportionate stratified sampling technique equal sample is selected in each stratum while in the disproportionate stratified sampling technique it is not possible to maintain equal ratio in each stratum. In present research researcher maintained the viz of proportionate sampling technique and pick 10% from each stratum.

3.6 Sample

Male and Female students of public universities of Islamabad considered as two major strata for the selection of the sample. According to the Higher Education Commission (HEC), Islamabad has a total of 15 public universities (See Appendix H). 11 out of 15 public universities are offering social science subject. Total 8659 students were enrolled in social sciences department of public sector universities. From which 4795 were male and 3864 were female. According to Gay, Mills and Airasians (2012) if the population lied or beyond 5000 than 500 would be the perfect sample size, which constitute the 10% of population. Keeping in view this thing researcher selected the 10% population as the sample for this study. Thus the numbers of male students were greater than female students. Sample size for the current study were n=866. That would 10% of the total population. To give appropriate share to each division 10% from both groups were selected as sample. In this way 480 male and 386 female students were chosen as the study's sample. The questionnaire was distributed among 866 students selected as a sample and 811 students fill the questionnaire and the rate of return was 93%.

Table No. 3.1

Sample of the study

Group	Population	Sample
Male	4795	480
Female	3864	386
Total	8659	866

3.7. Tool Construction

Researcher used a self-developed questionnaire as tool for data collection. The instrument was based on 5 Critical Thinking Skill of the theoretical framework by Elena, Rave, Gabriel, Monsalve, Andrés, Botero and Brand (2017). Researcher did not found any suitable tool regarding critical thinking skills in Pakistani context based on Critical thinking skills. So researcher developed questionnaire based on theoretical framework. For this reason researcher observed tools regarding critical thinking skills and construct the items regarding critical thinking skills sub dimensions which was based on theoretical framework selected for this research. The (CT) Skills were interpretation, analysis, argumentation, evaluation, and inference (See Appendix I). Further the tool was dived into two sub parts that were based on Demographic information and Critical Thinking Skills (CTS).

3.7.1 Demographic Information

The items related to demographic information was based on gender, grade/Level, Age, background, parents' educational background and last exams percentages.

3.7.2 Critical Thinking Skills (CTS)

This section was based on Critical Thinking Skills Questionnaire . There were 78 items in total and each dimension had 15-16 items in 5 dimensions. 76 statements were based on items with close ended and 2 open ended questions 77 and 78 were included for just intended the knowledge related to critical thinking skills in students, details of the closes ended items were given in table 3.2 below.

Table No 3.2

Description of Critical Thinking Skills Scale

Serial No.	**Dimension**	**Sub dimensions**	**Items**	**No. of Items**
1	Critical thinking skills			76
1a		Interpretation	1,2,3,4,5,6,7,8,9,10,11,12,13, 14,15	15
1b		Analysis	16,17,18,19,20,21,22,23,24,25, 26,27,28,29,30	15
1c		Argumentation	31,32,33,34,35,36,37,38,39,40, 41, 42,43,44,45	15
1d		Evaluation	46,47,48,49,50,51,52,53,54,55, 56, 57,58,59,60,61	16

1e	Inference	62,63,64,65,66,67,68,69,70,71, 72, 73,74,75	15

The Table showed the details of the critical thinking skills items compressed of 76 items which were focused on five sub-sections. There were 15-16 items in each sub-section.

3.7.3 Validity of the Instrument

In this study the researcher had used self-developed questionnaire. For the validity of the questionnaire, the researcher consulted five experts for the sake of validation of critical thinking skills (CTS). The experts observed the questionnaire in the light of objectives, title of the research and models. Experts had given comments and advices for improvement of the questionnaire, the questionnaire was improved, rearranged and prepared for data collection by following their valuable remarks and suggestions. Experts validate the questionnaire that were given in Appendix F. Experts those validate the critical thinking skills questions are listed below in table.

Table No 3.3

List of Experts for Tool Validation

Expert Name	**Designation**	**Institute name**	**Date**
Dr. M Ajmal Chaudhary	Chairman Department of Distance &Non Formal Education	Allama Iqbal Open University Islamabad	26-12-2019
Dr. Imran Yousuf	Chairman Department of Education	PMAS-Arid Agriculture University Rawalpindi	23-12-2019

Dr.Shazia Naween	Assistant Professor	International Islamic University Islamabad	2-1-2020
Dr. Shazia Zamir	Assistant Professor	National university Of Modern Languages Islamabad	8-1-2020
Dr. Malik Ghulam Behlol	In charge HOD Department of Education	Fatima Jinnah women University Rawalpindi	2-1-2020

3.7.4 Pilot Testing

The researcher selected the sample of 40 social science students from the National University of Modern Languages consisted of gender both males and females for pilot testing. The data was gathered by the personal visit by researcher. The researcher approached the students in social sciences departments and circulated the questionnaire to the students and asked them to complete the questionnaire. The researcher explained all about the questionnaire and asked them to choose the option from the five-point likert scale. The respondents were assured that the information they provided to the researcher was being used for only research purposes. The data was analyzed through Statistical Package for Social Sciences (SPSS).

3.7.5 Reliability of the Instrument

The data after pilot testing was analyzed through SPSS in order to obtain the result in form of tables assess the weak items of the questionnaire and improve these items for the final version. Cronbach's Alpha Reliability Test, Inter- section Correlation and Item total

Correlation were calculated in the pilot testing. The details of the reliability of the tools are given below.

3.7.5.1 Critical Thinking Skills

The critical thinking skills (CTS) were based on five sub section. The five sub sections were Interpretation, Analysis, Argumentation, Evaluation and Inference. This table showed and discussed about the Croanbach's Alpha Reliability scale of Critical thinking skills.

Table No 3.4

Cronbach's Alpha Reliability of Critical Thinking Skills Scale Pilot Testing (N = 40)

Scale	**Major Sections**	**Items**	**Cronbach Alpha Reliability**
Critical Thinking Skills		76	.968
	Interpretation	15	.803
	Analysis	15	.884
	Argumentation	15	.870
	Evaluation	16	.911
	Inference	15	.911

Table No 3.4 showed that the reliability of Critical Thinking Skills (CTS) was .968. The section was distributed in five sub sections (Interpretation, Analysis, Argumentation, Evaluation, and Inference) the highest Part of reliability is related to Interpretation considered reliable at .803, part related to Analysis considered reliable at .884, or related to Argumentation considered

reliable at .870, part related to Evaluation considered reliable at .911 and part related to inference considered reliable at .911.

Table No 3.5

Item-total Correlation of Critical Thinking skill Scale Pilot Testing (N = 40)

Items/Codes	r	Items/Codes	r	Items/Code	r
Q1/IN1	**.162**	**Q27/AN12**	**.582****	**Q53/E8**	**.473****
Q2/IN2	**.103**	**Q28/AN13**	**.356***	**Q54/E9**	**.576****
Q3/IN3	**.514****	**Q29/AN14**	**.590****	**Q55/E10**	**.521****
Q4/IN4	**.534****	**Q30/AN15**	**.596****	**Q56/E11**	**.697****
Q5/IN5	**.059**	**Q31/A1**	**.597****	**Q57/E12**	**.539****
Q6/IN6	**-024**	**Q32/A2**	**.304**	**Q58/E13**	**.488****
Q7/IN7	**.641****	**Q33/A3**	**.292**	**Q59/E14**	**.522****
Q8/IN8	**.566****	**Q34/A4**	**.546****	**Q60/E15**	**.656****
Q9/IN9	**.693****	**Q35/A5**	**.538****	**Q61/E16**	**.407****
Q10/IN10	**.521****	**Q36/A6**	**.601****	**Q62/I1**	**.669****
Q11/IN11	**.370***	**Q37/A7**	**.750****	**Q63/I2**	**.538****
Q12/IN12	**.608****	**Q38/A8**	**.532****	**Q64/I3**	**.745****
Q13/IN13	**.653****	**Q39/A9**	**.637****	**Q65/I4**	**.656****
Q14/IN14	**.627****	**Q40/A10**	**.544****	**Q66/I5**	**.606****
Q15/IN15	**.587****	**Q41/A11**	**.571****	**Q67/I6**	**.571****
Q16/AN1	**.612****	**Q42/A12**	**.534****	**Q68/I7**	**.719****

Q17/AN2	**.329***	**Q43/A13**	**.499****	**Q69/I8**	**.545****
Q18/AN3	**.571****	**Q44/A14**	**.583****	**Q70/I9**	**.739****
Q19/AN4	**.531****	**Q45/A15**	**.537****	**Q71/I10**	**.664****
Q20/AN5	**.733****	**Q46/E1**	**.741****	**Q72/I11**	**.634****
Q21/AN6	**.361***	**Q47/E2**	**.667****	**Q73/I12**	**.598****
Q22/AN7	**.528****	**Q48/E3**	**.539****	**Q74/I13**	**.561****
Q23/AN8	**.596****	**Q49/E4**	**.485****	**Q75/I14**	**.635****
Q24/AN9	**.583****	**Q50/E5**	**.673****	**Q76/I15**	**.576****
Q25/AN10	**.522****	**Q51/E6**	**.722****		
Q26/AN11	**.630***	**Q52/E7**	**.592****		

Correlation is significant at the 0.01 level (2-tailed).**

Correlation is significant at the 0.05 level(2.tailed).*

This table No 3.4 indicates the Item-total Correlation in Critical Thinking skill Scale. Item No Q37/A1 (.750**) was the highest correlation and the lowest correlation was Item No.IN6/Q6 (-.024).

Table No. 3.6

Intersection Correlation of critical thinking skills Scale Pilot Testing (N = 40)

	Interpretation	Analysis	Argumentation	Evaluation	Inference	Domain	Critical Thinking
Interpretation	1						
Analysis	.830**	1					
Argumentation	.617**	.663**	1				
Evaluation	.575**	.683**	.734**	1			
Inference	.696**	.721**	.830**	.885**	1		
Critical Thinking skill	.824**	.872**	.877**	.891**	.945**	1	

Correlation is significant at the 0.01 level (2-tailed).**

The above table reveals all the sub-parts were statistically significantly associated with each other at the point of significance of the 0.01 stage. The highest correlation were found between Inference and Critical Thinking Skill (CTS) (.945**). While the lowest intersection were found between evaluation and argumentation (.633**).

3.7.6 Revision/Final Version of Research Tool

The table indicated that only 5 of the 76 items had a correlation of less than 0.30. The items were IN1, IN2, IN5, IN6, and A3.

For the tool development. Most of these items were changed for the finalized version of the questionnaire.

The below table shows the final version of the research tool.

Table No.3.7

List of items (Final Version) Critical Thinking Skills (CTS)

Serial No.	**Scale**	**Sub Scale**	**No. of Items**	**Codes**
1	Critical thinking Skills		76	
1a		Interpretation	15	IN1-IN15
1b		Analysis	15	AN1-AN2
1c		Argumentation	15	A1-A15
1d		Evaluation	16	E1-E16
1e		Inference	15	I1-I15

Table 3.6 indicates that the items used in the final version of the tool are detailed. There were a total of 76 items in which 1 item in question was reversed. That item was IN6.

3.8 Factor Analysis

The purpose of Factor analysis is to measure the construct validity of the research instrument. Researcher developed the questionnaire for this study so exploratory factor analysis was run. Due to shortage of time and limited data at this stage items were finalized on the basis of pilot trail where tool items were finalized by applying Cronbach's Alpha Reliability, Inter-section

Correlation and Item total Correlation. However after complete data collection Exploratory Factor Analysis (EFA) was additionally run. So revised tool after running (EFA) was given in (Appendix K).

3.9 Data Collection

Data collection is the method by which information about the target area is collected. Data collection is a very important part in the conduct of research after that the results of the data collection process are collected by the researcher on the basis of the result, discussion is then made. The data was collected from social sciences students by personal visit and collected the data through self-developed questionnaire from public universities of Islamabad. Whole of the questionnaire/ data was collected by only social sciences students of public university students.

One of the important parts of the research process is data collection. As well as comprising of different stages, this step was time-consuming and crucial. During COVID-19, the researcher collected data for the current study, after which Due to the nation's pandemic situation, all educational institutions, including universities, were closed at the time, and students were not permitted to enter universities for any reason. The researcher faced a significant challenges because the existed study population consisted of students from Islamabad's public universities, and because of the pandemic condition, the researcher was unable to obtained data from universities. The researcher came up with the idea of collecting data online via email, google form, whatsapp and facebook groups as a solution for this problem. Further information concerning the procedure for following are some examples of data collection:

Round 1

Step 1: Since the researcher was unable to visited universities for data collection due to COVID-19, the first and most important phase in the data collection process was to identify groups of students studying social sciences. For this reason, the researcher posted messages on university groups on social media of Islamabad public university.

Step 2: The researcher then developed a Google Forms questionnaire to make it easier for participants to fill out the questionnaire online.

Step 3: After received university contacts from university groups, the researcher attached the questionnaire built on Google Forms and sent it to the students via a Google Form connection. Participants were encouraged to engage in the study by describing the pandemic situation, as a result of which the researcher collected data online for the purpose of the study, as well as the study's possible benefit to that university and the entire education sector.

Step 4: The questionnaire was distributed to a total of N=866 participants, who were male and female students from the social sciences departments of Islamabad's public universities.

Step 5: The majority of students did not click on the link or completed the questionnaire**.** despite all of the researchers' efforts. That is why the rate of response was poor. So when universities are open form some month researcher collected the data from students. researcher also guaranteed the participant that all their data are taken confidential.

Round 2

Step 6: Researcher visited university and distribute the questionnaire to university students.

Step 7: After two and a half weeks researcher take questionnaire back for further procedure.

Step 8: The response rate by Google Form link was just 109 out of 866, which is 12 percent of the researchers' total questionnaires. The response rate was very poor. On the other hand when researcher takes the data by self when universities are opened respond rate was high. The overall number of questionnaires circulated by female and male university students was 757, and the researcher received 702 questionnaires.

3.10 Data Analysis

The data was gathered using a questionnaire, by coded, and analyzed through using the social sciences statistics package. Statistical techniques such as the Factor analysis (EFA) mean and t-test were applied for the purpose of items construct validity and data analysis. Objective number 2 was to compare the critical thinking skills among university on the basis of gender. For the comparison independent sample t-test was applied through using inferential statistics. The t-test is used when researcher does not know the standard deviation and mean of exact/population. The independent t-test, also known as the two t-test samples, independent t-test samples, or student t-tests, is an inferential statistical test that decides whether there is a statistically significant difference in the mean between two unrelated groups. In this analysis, male and female students were viewed as different samples.

The output obtained through this test was shown in Chapter 5 in tabular form. The statistical test used for testing the hypotheses is described in the following table.

Table No. 3.8

Description of objectives, hypothesis, instruments and statistical analysis

Objectives	**Hypothesis**	**Instrument**	**Statistical test used**
To explore the practices related to critical thinking skills among university students		Questionnaire	Mean
To compare the critical thinking skills among university students on the basis of gender	There is no statistically significant difference in critical thinking skills among university students on the basis of gender.	Questionnaire	t-test

3.11. Ethical Consideration

When interacting with the public and their data, optimal practices in research include ethical consideration. Aside from academic integrity, researchers must be cognizant of the ethical considerations involved in data collecting. They must be honest and polite in their interactions with research participants, inflicting no damage to them. According to the American Association for Public Opinion Research (AAPOR), some ethical requirements for survey research were followed in the current study. They consist of the following.

- The present researcher was based on critical thinking skill comparison among university students on the basis of gender. The participant name was not mentioned in the questionnaire and proper paragraph was mentioned about it that researcher just gather this information for research purpose. It was cleared to all respondent that their information was used only for the research purpose.
- The anonymity and confidentiality of the respondents, as well as the universities that permitted data gathering on their grounds, were ensured throughout the investigation.
- None of the respondents were pushed or pressured to participate in the study, and their participation was entirely voluntary.
- There were no incentives provided to respondents in exchange for their participation in the survey.
- The data presented in this study is self-reported data by respondents and was not manipulated or invented.
- All sources, including research papers and books, were listed in the reference list.

3.12. Summary

The chapter discussed the methodology step by step. First research approach was discussed in which it was mentioned that research was based on quantitative approach. The main focused of the research was to explore the practices of critical thinking skills among university level and to compare the critical thinking skills among university students on the basis of gender. For this purpose quantitative approach was chosen. Data is collected by self developed questionnaire based on critical thinking skills presented by Elena et al. (2017). A five point likert scale was used to score the items. From strongly disagree to strongly agree. There were two main objectives of the study and method that was used is survey and descriptive comparative design

was used. As we know objectives are the foundation of the research so for that purpose researcher developed two main objectives No 1 To explore the practices related to critical thinking skills among university students and No 2 To compare the critical thinking skills among university students on the basis of gender. Population of the study included male and female students studying in social science department of Islamabad public universities. Total students are 8659 among 4795 students were male and 3864 were female students. In Islamabad according to HEC Total public universities are 15. While 11 Public students are offering social science subjects. The proportionate stratified technique was used and sample of the study were 866 students. That why 10 percent of the total population were taken as a sample. In this way 480 male and 386 female students was chosen. Researcher used self developed questionnaire which was based on five critical thinking skills. further tool were based on demographic information and critical thinking skills. There were total 78 items form which 2 questions are open ended just to know about concept of critical thinking skill importance in students. As researcher used self developed questionnaire so validity required for the instruments so five experts observed this questionnaire in the light of objectives after validation of the questionnaire researcher select 40 social sciences students from the National university of Modern language consisted of gender both male and female for pilot trial. The data was analyzed and assess the strength of the items and improve weak items cronbach's Alpha Reliability test, Inter-section Correlation and Item correlation were calculated in the pilot testing. The data is collected from social sciences students due to Covid- 19 it was difficult but when universities were opened for some data was gathered. Researcher also tried to get the data online but the research did not find significant results. The data is gathered by using questionnaire and analyzed through using Social Science Statistic package. The statistical technique Cronbach Alpha Reliability test, Correlation,

Mean and t-test were applied for the purpose of data analysis. All the things related to methodology were discussed in a detail in this chapter.

CHAPTER 4

ANALYSIS OF DATA AND INTERPRETATION

4.1 Introduction

In this chapter data was presented in tabular form in detail. Data was received from 811 students and analyzed by SPSS 21st version. The study was based on quantitative approach further more comparative research method is used. The study is both inferential and descriptive due to requirement of objectives. The study is based on one variable that is critical thinking. The aim of the study is to explore gender-based critical thinking skills among university students., which is inferential in nature so researcher will apply independent sample T-test. Furthermore, researcher also needs to explore the students practices related to critical thinking skills among university student, which is descriptive in nature so researcher will calculate the mean. The researcher had used self developed questionnaire for data collection and it was based on variable questionnaire is based on Critical thinking Domain presented by Elena, Rave, Gabriel, Monsalve, Andrés, Botero& Brand (2017). It would consisted of 5 sub scales that were Interpretation, Analysis, Argumentation, Evaluation, and Inference (See Appendix E). Questionnaire was consisted of two parts; Demographics and Critical thinking skill. There were 76 items in total and each dimension had 15-16 items in five dimensions. All 76 statements were based on closed-end items. All the data was analyzed through mean score and an independent t-test. The researcher analyzed and interpreted the data in detail.

4.2 Section wise Analysis

Based on the nature of the analysis, that unit was based on four parts. Statistically test were applied. Mean and independent t-test were applied for the data process.

Section I Exploratory Factor Analysis (EFA)

Section number 1 is focused on research-based analysis related to construction of tool. The tool which was based on critical thinking skills presented by Elena, Rave, Gabriel, Monsalve, Andrés, Botero & Brand (2017).The (EFA) was run to check the construct validity of the instrument. The Purpose of this analysis was to measure the construct validity of the research instrument. For this research researcher developed the questionnaire and after complete data collection. (EFA) was applied on obtained data to check the construct validity of the instrument. It is one of the statistical strategies that require a decent sample size. According to Kyriazos (2018) 300 and above sample size is perfect to find the accurate consistency of the result. Although 300 and above sample size is perfect for applying factor analysis. So the sample size of the current study was suitable to run (EFA). Current Study sample size was 866 students from which 811 students gave responses so this sample size is suitable for (EFA).

Section II Demographic Presentation of the Sample

In this part Demographic details as well as its interpretation are discussed in feature. Demographic information was built on respondents background. For this reason the researcher added a question relating to demographic details. Demographic questions are based on their gender, grade/level, and last exams.

Section III Student's critical thinking skills

This section is focused on objective No 1, which was to discuss gender-based practices related to critical thinking skills among university students**.** Further practices related to critical thinking are divided in interpretation, analysis, argumentation, evaluation and inference.

Section IV Gender-based comparison of critical thinking skills

The fourth section was based on the second objective, which was to compare critical thinking skills among university students by gender. Further this objective is compare on critical thinking (interpretation, analysis, argumentation, evaluation and inference).

Section V Open Ended questions Analysis

In the fifth part researcher analyzed the answers of two open ended questions to know the knowledge of critical thinking of students. Q1 was what does critical thinking means to you? And Q 2 was How important is critical thinking to you?

Section 1

4.3 Exploratory Factor Analysis

Table 4.1

KMO and Bartlett's Test of Critical Thinking skill Scale (n=811)

Kaiser Mayer-Olkin Measure KMO and Bartlett's Test	
Kaiser - Mayer- Olkin Measure of Sampling Adequacy	*.855*

Table No 4.1 showed the Kaiser-Meyer-Olkin Measure (KMO) value was .855 which was fairly acceptable. The value showed that the sample size was suitable for factor analysis. According to Kaiser (1974), if values is less than 0.5 it means sample size is not acceptable, whereas values more than 0.5 show that sample size is acceptable, values 0.5 to 0.7 show medium adequacy of sample size, values 0.7 to 0.8 show that sample size is good, and values 0.8 to 0.9 show that sample size is outstanding.

Table 4.2

Total Variance Explained of Critical Thinking skill Scale (n =811)

Components	**Total**	**% of Variance**	**Cumulative %**
1	10.692	14.068	14.068
2	2.881	3.791	17.859
3	2.050	2.698	20.557
4	1.970	2.592	23.148
5	1.801	2.369	25.518

The above table No 4.2 explained total variance and shows that 5 components were loaded. Component 1 show 14.068 variance, Component 2 show 3.791 variance, Component 3 show 2.698 variance, Component 4 show 2.592 variance and Component 5 show 2.369 variance.

Table 4.3

Rotated Component Matrix[a] Critical Thinking skill Scale (n=811)

	Components				
	1	2	3	4	5
Q36.	.550				
Q 76	.518				
Q 73	.447				
Q29	.472				
Q54	.460				
Q52	.425				
Q42	.413				
Q 37	.396				
Q51	.389				
Q34	.385				
Q39	.378				
Q75	.378				
Q53	.373				
Q40	.351				

Q57	.345	
Q50	.341	
Q55	.337	
Q27	.297	
Q56	.297	
Q41	.285	
Q21		.526
Q65		.515
Q 70		.498
Q66		.448
Q60		.434
Q8		.427
Q24		.420
Q68		.401
Q47		.399
Q64		.391
Q67		.388
Q46		.384
Q48		.350
Q45		.325
Q25		.315
Q7		.284
Q72		.280

Q43	.260		
Q 13		.529	
Q3		.459	
Q4		.423	
Q10		.411	
Q59		.409	
Q63		.404	
Q69.		.400	
Q9		.386	
Q18		.378	
Q12		.377	
Q49		.376	
Q11		.357	
Q6		.331	
Q22		.330	
Q28		.322	
Q 14		.315	
Q16		.315	
Q58		.314	
Q19		.263	
Q33			.482
Q31			.473
Q26			.466

Q71	.396	
Q62	.351	
Q20	.337	
Q23	.311	
Q44	.305	
Q38	.302	
Q61	.294	
Q15	.279	
Q 32	.279	
Q5		.592
Q35		.463
Q1		.446
Q74		.377
Q17		.368
Q30		.363
Q2		.318

The above table No 4.3 shows that rotation matrix component 1 explains that 20 items Q36, Q76, Q73, Q29, Q54, Q52, Q42, Q37, Q51, Q34, Q39, Q75, Q53, Q40, Q57, Q50, Q55, Q27, Q56, Q41 were loaded on factor 1. Component 2 explains that 18 items Q21, Q65, Q70, Q66, Q60, Q8, Q24, Q68, Q47, Q64, Q67, Q46, Q48, Q45, Q25, Q7, Q72, Q43 were loaded on factor 2. Component 3 explains that 19 items Q13, Q3, Q4, Q10, Q59, Q63, Q69, Q9, Q18, Q12, Q49, Q11, Q6, Q22, Q28, Q14, Q16, Q58, Q19 were loaded on factor 3. Component 4 explains that 12

items Q 33, Q31, Q26, Q71, Q62, Q20, Q23, Q44, Q38, Q61, Q15, Q32 were loaded on factor 4

Component 5 explains that 7 items Q15, Q35, Q1, Q74, Q17, Q30, Q2 were loaded on factor 5.

Following are the titles assigned to the factors

Factor 1 Analysis

Factor 2 Inference

Factor 3 Interpretation

Factor 4 Evaluation

Factor 5 Argumentation

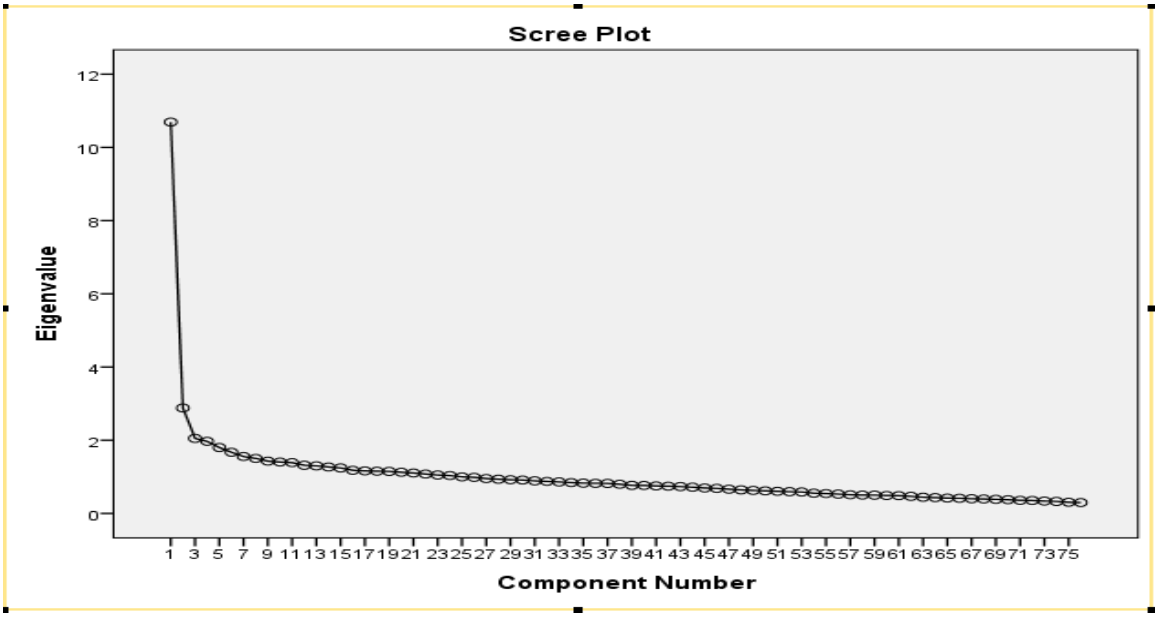

Figure 4.1 Scree Plot

A scree plot is the visualize form of Rotation matrix . This graph show 5 factors were loaded.

Section II Demographic Presentation of the Sample

4.4 Demographics of the Sample

Table 4.4

Sample Distribution Based on Gender (n= 811)

Gender	Frequency	Percent
Male	457	56.4
Female	354	43.6
Total	811	100.0

The respondents was divided into two categories: male and female students at Islamabad's public universities. Table 4.4 shows that total respondents were 811 from which mostly respondents 457 (56.4%) were male students and 354 (43.6%) were female students. above table also indicated that respondents were students of social sciences departments of Islamabad public universities.

Table 4.5

Sample distribution based on Grade (n=811)

Grade	Frequency	Percent
Bs	287	35.4
MS	239	29.5
MPhil/PhD	285	35.1
Total	811	100.0

Table No 4.5 indicates that there were 811 total students contributed as sample. In this table 287(35.4%) students were BS program students. while 239(29.5%) were students of MS

program. The students of M Phi/ PhD were 285(35.1%). Above table also indicated that mostly data was taken from Bs program students and then rest of the data was collected from MS and M Phil program students.

Table 4.6

Sample distribution based on last exam percentage (n=811)

Percentage	**Frequency**	**Percent**
0-25	159	19.6
25-50	196	24.2
50-75	190	23.4
75-100	266	32.8
Total	811	100.0

Table No 4.6 shows that total students were 811 and their last exams percentages. It is indicated that 159(19.6%) students last exams percentages were 0-25. Moreover, 196(24.2%) students last exams percentages were between 25-50. Furthermore, 190(23.4%) students last exams percentages were between 50-75. Whereas 266(32.8) students last exam percentages were between 75-100. Table also shows that In 811 students 266 students got 75- 100 percentage in their last exams and 159 students got 0-25 percentage in their last exams.

Section III

4.5 Practices of critical thinking skills among university students

Objective No.1 To explore the practices related to critical thinking skills among university students.

Table 4.7

Students Practices Related to Critical Thinking Skills among university (n=811)

Skills	n	Mean	S.D	Remarks
CTRICAL THINKING	811	3.26	.45	Neutral
INTERPRETATION	811	3.29	.53	Neutral
ANALYSIS	811	3.28	.55	Neutral
ARGUMENTATION	811	3.19	.51	Neutral
EVALUATION	811	3.28	.55	Neutral
INFERENCE	811	3.27	.56	Neutral

Table No 4.7 showed the practicing of critical thinking skills among university students. Table result showed mean of variable. Total students were 811 while mean of first variable interpretation was 3.29. Mean of Analysis was 3.28. Mean of Argumentation was 3.19. Mean of Evaluation was 3.28 and Mean of Inference was 3.27. Results showed that means values were neutral about critical thinking skills practices among university students which mean that respondents were undecided about their practices at university level. All sub constructs were dominating problems regarding practices.

The results indicated that practices regarding interpretation skills were neutral. The practices of interpretation skills were evaluated by: can they easily comments on class fellow point of view in

class discussion, organize idea for understanding, differentiate between main idea or sub idea, summarize the knowledge, express idea in classroom, use pictures and diagram to express idea, describe the lecture and draw conclusion these types of practices, share their knowledge in better way. Result indicated that the respondents were undecided about these practices at university level.

The result indicated that practices regarding analysis were neutral. The practices of analysis skills were indicated by statements: can they compare two ideas while discussion, contrast two ideas, find out the links between concepts. Use mind mapping, break down the ideas into simple, develop graphics description, write key points, inspects the things logically. make conclusion from discussion. Findings indicated that the respondents were undecided about these practices at university level.

The result indicated that practices regarding argumentation were neutral. The practices of argumentation skills were indicated by using statements: can they clearly present point of view in discussion, defend their position in class, answer the questions asked during discussion, clearly make arguments on facts, give suggestions based on knowledge, use alternative statements to clear the arguments, focus on answer before giving it, summarize in clear way. Result showed that the respondents were undecided about these practices at university level.

The result indicated that practices regarding evaluation were neutral. The practices of evaluation skills were indicated by statements ; can critically examine the information, make clear judgment, judge other opinion, cut down concepts on the basis of result, reframe the content according to situation. easily review the content, use discussion method to validate points, easily identify the information. Result indicated that the respondents were undecided about these practices at university level.

The result indicated that practices regarding inference were neutral. The practices of inference skills were explored through statements: can predict future events based on my previous experiences, identify gaps and inquire information, double check information for its accuracy, research about the content to enhance understanding, use different sources to resolve problems, use alternative ways in doing task. Findings showed that the respondent were undecided about these practices at the university level.

Section IV

4.6 Gender wise comparison of critical thinking skills

Objective No.2 To compare the critical thinking skill among university on the basis of gender.

H_{o1}: There is no statistically significant difference in critical thinking skills among university students on the basis of gender

Table 4.8

Comparison of critical thinking skills among university students on the basis of gender (n=811)

Variable	Gender	N	Mean	t value	df	Sig
Critical Thinking	Male	457	3.28			
	Female	354	3.24	1.271	809	.204

**p <0.05, **p <0.01*

For the study's second objective, the researcher used an independent t-test to compare critical thinking skills between male and female students at Islamabad's public universities. Above Table No 4.8 indicates that t value (t= 1.271) was statistically not significant at the 0.05 level. Thus there was no significant difference found between Male M=3.28 and Female M=3.24 respondents related to the critical thinking skills among university students. Thus the hypothesis H_{o1}: **There is no statistically significant difference in critical thinking skills among university students on the basis of gender** is accepted.

Objective No. 2a To compare the interpretation skills among university students on the basis of gender.

Hº1(a): There is no statistically significant difference in interpretation skills among university students on the basis of gender.

Table 4.9

Comparison of interpretation skills among university students on the basis of gender (n=811)

Variable	Gender	N	Mean	t value	df	Sig
Interpretation	Male	457	3.32			
	Female	354	3.26	1.513	809	.131

**p <0.05, **p <0.01*

Above Table No 4.9 indicates t-value (t= 1.513) was statistically not significant at the 0.05 level. Thus there was no significant difference between Male M=3.32 and Female M=3.26 respondents related to interpretation skills among university students. Thus the hypothesis No **Hº1(a) There is no statistically significant difference in interpretation skills among university students on the basis of gender is** accepted.

Objective No. 2b To compare the analysis skills among university students on the basis of gender.

Hº1(b): There is no statistically significant difference in analysis skills among university students on the basis of gender.

Table 4.10

Comparison of analysis skills among university students on the basis of the gender (n=811)

Variable	Gender	n	Mean	t value	df	Sig
Analysis	Male	457	3.29			
	Female	354	3.28	.172	809	.863

**p <0.05, **p <0.01*

Above Table No 4.10 indicates that t value (t=.172) was statistically not significant at the 0.05 level. Thus there was no significant difference found between Male M=3.29 and Female M=3.28 respondents related to analysis skills among university students. Thus the hypothesis No **Hº1 (b): There is no statistically significant difference in analysis skills among university students on the basis of gender** is accepted.

Objective No 2.c To compare the argumentation skills among university students on the basis of gender.

H^0l(c): There is no statistically significant difference in argumentation skills among university students on the basis of gender

Table 4.11

Comparison of argumentation skills among university students on the basis of the gender (n=811)

Variable	Gender	N	Mean	t value	df	Sig
Argumentation	Male	457	3.21			
	Female	354	3.18	.737	809	.461

**p <0.05, **p <0.01*

Above Table No 4.11 indicates that t value (t=.737) was statistically not significant at the 0.05 level. Thus there was no significant found between male M=3.21 and female M=3.18 respondents related to argumentation skills among university students. Thus the hypothesis No **H^0l(c) There is no statistically significant difference in argumentation skills among university students on the basis of gender** is accepted.

Objective No 2.d To compare the evaluation skills among university students on the basis of gender.

H^ol(d): There is no statistically significant difference in evaluation skills among university students on the basis of gender

Table 4.12

Comparison of evaluation skills among university students on the basis of the gender (n=811)

Variable	Gender	n	Mean	t value	df	Sig
Evaluation	Male	457	3.29			
	Female	354	3.28	.172	809	.863

**p <0.05, **p <0.01*

Above Table No 4.12 indicates that t value (t=.172) was statistically not significant at the 0.05 level. Thus there was no statistically significant found between Male M=3.29 and Female M=3.28 respondents related to evaluation skills among university students. Thus the hypothesis No **H^ol(d) There is no statistically significant difference in evaluation skills among university students on the basis of gender** is accepted

Objective No 2.e To compare the inference skills among university students on the basis of gender.

H^0l(e): There is no statistically significant difference in inference skills among university students on the basis of gender.

Table 4.13

Comparison of inference skill among university students on the basis of the gender (n=811)

Variable	Gender	n	Mean	t value	df	Sig
Inference	Male	457	3.29			
	Female	354	3.26	.843	809	.400

**p <0.05, **p <0.01*

Above Table No 4.13 indicates that t value (t=.843) was statistically not significant at the 0.05 level Thus there was no statistically significant difference found between Male M=3.29 and Female M=3.26 respondents related to inference skills among university students. Thus the hypothesis No **H^0l(e) There is no statistically significant difference in inference skills among university students on the basis of gender** is accepted.

Section V

4.7 Open Ended Questions Analysis

The Researcher added these questions in questionnaire to explore about the knowledge of critical thinking skills. Students have and either they are aware about the importance of critical thinking skills. Only two open ended questions were added. But due to COVID-19 it was not possible for researcher to collect data by self so researcher converted question in google sheet and shared the link with students but they did not answer these questions and then universities were opened for some time researcher personally visited the university and filled those questions from respondents. Researcher just made 2 questions to know that were students aware the term of critical thinking and its importance at university level.

Table 4.14

Open Ended Question Analysis

Open Ended Questions	**Respondent**	**Responses**
Q.77. what does critical thinking means to you?	Male	It is a mode of thinking through we can solve and asses our problem
	Male	Through critical thinking we can analyze skillfully
	Female	It is a way to think critically and analyze the things critically to come on conclusion
	Female	It is a way through we

		come on best possible solution
Q.78 How important is critical thinking to you?	Male	It is important we enable express our idea and communicate easily
	Male	By practicing critical thinking we learn how to solve problem so yes it is important for me
	Female	It helps us to think critically
	Female	It is important to enhance critical thinking because we learn how to solve our daily issues in class

In response of Q77 mostly students answered that critical thinking is the process to analyze all the questions scenarios critically with using their mind critically. Which showed that they were little much aware of this terms and some of the students also responded that critical is the process of analyzing conceptualization and evaluate the things they gathered in the class. Which showed that they were highly aware about the importance of critical thinking skills at university level. These were general question related to knowledge and importance of critical thinking skills.

In respond of Q78 mostly students said yes it is important to enhance critical thinking in their life through activities and through analyzing and evaluating the questions critically. Moreover they also responded that it is the demand of this era to examine all the things critically and extracting meaning out of it so they can apply their knowledge in real life situations. It is indicated that students were little aware about the importance of critical thinking.

4.8 Summary of Results

The following was a summary of the current study's decisions on one main hypothesis and five sub hypotheses of male and female students in public universities in Islamabad.

Table 4.15

Summary of Results

No	Statement of hypothesis	Statistical Test	Decision	Result
H_O1	There is no statistically significant difference in critical thinking skills among university students on the basis of gender.	Independent Sample t-test	Accepted	t= 1.271,p<0.05
H_O1 (a)	There is no statistically significant difference in interpretation Skills among university students on the basis of gender.	Independent Sample t-test	Accepted	t=1.513,p<0.05
H_O1 (b)	There is no statistically significant difference in analysis skills among university students on the basis of	Independent Sample t-test	Accepted	t=.172,p<0.05

	gender			
H_O1 (c)	"There is no statistically significant difference in argumentation skills among university students on the basis of gender.	Independent Sample t-test	Accepted	t=.737,p<0.05
H_O1 (d)	There is no statistically significant difference in evaluation skills among university students on the basis of gender.	Independent Sample t-test	Accepted	t=.172,p<0.05
H_O1 (e)	There is no statistically significant difference in inference skills among university students on the basis of gender.	Independent Sample t-test	Accepted	t=.843,p<0.05

Overall results indicated that students were undecided about the practices of critical thinking skills among university level and they were not aware with the practices of critical thinking skill as it is important and about practicing these skills result showed that their responses were neutral which showed that they did not practice these skills in their classes. As it was a gender based comparative study regarding critical thinking skills among public university students of Islamabad. Questionnaire was main source so analyze these skills from respondent as researcher used self-developed questionnaire and reliability of the tool was.912 and each items of instrument were correlated with each other. At the significance level of 0.05, the correlation between the five dimensions were found statistically at the pilot trail total respondent were 40. After found that questionnaire was reliable. Final data was collected from 811 respondent form

which 457 were male students and 354 were female students. After this procedure researcher collected the data form the university students and enter all the data in SPSS where for checking the practices of critical thinking skill among university students statistical mean test was run and for comparison between gender t-test were run. The result after running the test showed that they practiced these skills at university level and there was no statistically significant difference found on the basis of gender among university students regarding practices of interpretation, analysis, argumentation, evaluation, and inference skills.

CHAPTER 5

SUMMARY, FINDINGS, CONCLUSION, DISCUSSIONS AND RECOMMENDATION

On the basis of the study, this chapter discusses the summary, findings, discussion, conclusion, and recommendation. The following are the chapter descriptions.

5.1 Summary

The main aim of the current study was to compare the CT skill among university student on the basis of gender.

1. To explore the practices related to critical thinking skills among university students.
2. To compare the critical thinking skills among university students on the basis of gender.

Researcher also developed five sub hypotheses in accordance to study objectives. The Theoretical framework of the study was based on Critical Thinking Domain presented by Elena, Rave, Gabriel, Monsalve, Andrés, Botero and Brand (2017). The framework contained five categories of critical thinking skills, such as interpretation, analysis, argumentation, evaluation and inference.

The research was based on quantitative approach. The quantitative approach is used to classify numerical data collection or knowledge that can be translated into usable statistics. The total population was based on 866 social sciences student from which 480 male and 386 female students will be selected. The researcher used the stratified proportionate sampling technique to select the sample of the study. The questionnaire was used by the researcher to obtain data from

both male and female university students. For data collection, The researcher used a questionnaire that was developed by researcher. This was consisted of two parts; Demographics and Critical thinking skills. The demographics part was considered on gender, grade/level, age, job status, background, parent's educational background and last exams percentage while respondents' level of critical thinking skills was measured through the self-developed questionnaire based on critical thinking domain presented by Elena, Rave, Gabriel, Monsalve, Andrés, Botero & Brand (2017). Total items were 78 and each dimension had 15-16 items in five dimensions and two open ended questions are added to know the concept of critical thinking skills in students. 76 statements were based on objects with closed ended. Researcher contacted the five experts in the field of education for the purpose of validation of the tool. The tool was improved after considering the valuable suggestion provided by the experts. Researcher also conducted the pilot testing to check the reliability. For pilot testing data were collected by 40 male and female students. After analyzing the result of pilot testing tool was improved. Moreover Researcher add demographic portion in questionnaire to collect the background of the respondent. Further due to COVID-19 situation in Pakistan. The researcher shared the questionnaire through Google sheet link to both female and male students of public universities in Islamabad to collect data online. Researchers used SPSS 21st version to analyze the data. These tests Cronbach Alpha, Item Total Correlation, Inter-Section Correlation, Mean Score, and Independent T-Test were analyzed. Therefore, after analyzing the data, the researcher interpreted the findings and give recommendations based on the findings.

5.2 Findings

The study's results were explored in detail in this section. The results are shown into steps.

1. After analysis of the data gathered by the researcher. The total number of respondent were 811. Researcher developed the questionnaire by herself that is why factor analysis was run by using KMO Bartlett's technique. KMO value range was 0 to .1. Test showed the value .85 which is acceptable so it is approved that sample size of factor analysis was perfect.
2. The findings related to total variance explained of components in factor analysis. It has been noted that total variance explained 5 components and the Eigen value was above than .1
3. In the graph of scree plot it is showed that all the items were correlated with each other's basically it visualize the Eigen value. The graphs showed that all items were strong and lying on point 2 and above.
4. The findings related to rotation matrix component showed that 76 items were loaded in 5 factors
5. The total numbers of respondents were 811 from which male students were 457 and female students were 354 studying at Islamabad's public universities. It has also been noted that male students were more rather than female students in Islamabad's public universities after that pilot trail questionnaire was distributed to the sample of the study for final data collection and for analysis
6. Finding regarding the practices of critical thinking among students at university level. It was founded that students were undecided about their practices related to critical thinking skills in university level. According to result students were undecided about all skills interpretation, analysis, arguments, evaluation and inference among public universities

of Islamabad. Students of the public university students were not sure about the practices in their classes and results indicated that their responses were neutral about these skills.

7. In the finding regarding comparison of critical thinking skills among students on the basis of gender. The t value was statistically not significant at the 0.05 level. (t=1.271; p=.204). It showed that there was statistically no significant difference in critical thinking skills among university students between female and male respondents. As per result significant difference was not found on the basis of gender.

8. According to the finding related to comparison of interpretation skills among students on the basis of gender. The t value was statistically not significant at the 0.05 level. (t=1.513; p=.131). It showed that there was no significant difference in interpretation skills between female and male respondents among university students. As per result significant difference was not found among students on the basis of gender.

9. The finding regarding comparison of analysis skills among students on the basis of gender. The t value was statistically not significant at the 0.05 level. (t=.172; p=.863). The results showed that there was no significant difference in analysis skills between female and male respondents. The result also showed there was no significant difference found regarding the analysis skills among university students on the basis of gender.

10. The finding related to comparison of argumentation skills among students on the basis of gender. The t value was statistically not significant at the 0.05 level. (t=.737; p=.461). It showed that there was no significant difference in argumentation skills among university between female and male respondents. The result also indicated that there was no significant difference found regarding the argumentation skills on the basis of gender.

11. The finding related to comparison of evaluation skills among university students on the basis of gender. The t value was statistically not significant at the 0.05 level. (t=.172; p=.863). It revealed that there was no significant difference in evaluation skills among university between female and male respondents. The result also showed that there was no significant difference found regarding the evaluation skills among university students on the basis of gender.
12. The finding related to comparison of inference skills among university students on the basis of gender. The t value was statistically not significant at the 0.05 level. (t=.843; p=.400). It showed that there was no significant difference in inference skills among university between female and male respondents. The result also showed that there was no significant difference found regarding the inference skills among university students on the basis of gender.

5.3 Discussion

The study main purpose was to compare critical thinking skills (CTS) among university students based on gender. This study conducted on students from Islamabad's public universities and had two main objectives. The study's first objective was to “To explore the practices related to critical thinking skills among university students”. The researcher was used self developed questionnaire to collect information from respondents. The data was gathered by the researcher and it’s indicated that university students showed that were undecided about their practices related to critical thinking skills. Teachers encouraged and promote students' critical thinking skills since critical thinking (CT) is a crucial attribute in intellectual development, knowledge acquisition, and knowledge utilization (kong, 2006; Loving & Wilson, 2000 Wangensteen, Johansson, Bjorkstrom, & Nordstrom, 2010). It is believed that teacher know what is critical

thinking and teacher will incorporated these skill through their teaching practices however this not always be true (Choy &Cheah, 2009; Mangena & Chabeli, 2005). And it is also observed in these researches Case (2005) Kennedy et al., (1991), Willingham, (2007) stated that researchers mostly work in this area of critical thinking and understand the significance of critical thinking skills in Learners. The research was conducted at first year student at college level Marni, Suyono, Roekhan & Harsiati (2019). Research indicated in the student's they found three logical thought trends, namely, Sequence I (Inference-Assessment) and Sequence II (Analysis-Assessment), Sequence III (Interpretation-Appraisal). There were four pattern changes in pattern two, though Patterns I and III had only one pattern. The outcomes of this research have shown that the logical thought habits of students is directed towards analytical reasoning, In specific, the study of different phenomena by sharing facts and explanations for drawing logical conclusion. McLean, (2005).report highlighted the quality of critical thinking skills and types of Independent reasoning that participants have not consistently shown in this analysis. Accurate, rational, help, and scope were consistency standards that were not regularly illustrated. Supporting inferences and interpretations and drawing value decisions is often found in the categories of rational reasoning. In higher education, At the beginning of the academic year, it is really helpful for students and lecturers to consider critical reasoning ability to process the 2018 learning well (Kaya et al., 2018). For learners, the way they will view, analyze, infer, and evaluate topics surrounding them can teach students to achieve the complexity of thinking. It will encourage students in each given class to be competitive in the academic field. The logical thinking skill is able to help student’s logic to overcome problems (Jatmiko et al., 2018).Students at universities must complete courses with decent grades to be able to address both academic and personal problems (Andheska et al., 2020). Marn et al., (2019),Serin, (2013a) stated Therefore, students

need to develop their critical thinking skills when dealing with multiple learning difficulties. According to Saeed, Khan, Ahmed, Gul, Cassum, & Parpio (2012) in their result study indicated that these skills are developed by educators if they focus to ask questions and if they wanted to enhance these critical thinking skills in their students at any level. It is also observed in Pakistan and true in a country like Pakistan, where the primary focus of education for students is rote learning rather than the acquisition of CT skills, and teachers are seen as knowledge dispensers rather than knowledge facilitators (Davies & Iqbal, 1997; Dean, 2005; Gul et al., 2010; Siddiqui, 2007). That's why result showed that they are ensure about their practices related to critical thinking skills at university level.

The study's second objective was "To compare the critical thinking skills among university students on the basis of gender". Traditional concepts have indicated that men are superior in logical thought, so they are better critical thinkers. However, technically speaking, Gender differences in CT have remained a point of contention among researchers. Some research deny disparities in gender in CT measures and some accept the role of gender differences in CT abilities in their effect on CT abilities. In the research of Kuhn's (1992) findings showed that critical reasoning does not vary with sex. Semeric (2010) also stated that there was almost zero association between gender and CT sub dimensions. This finding is also supported by the research of Myers and Dyer (2006). In these two studies, There was no difference in CT abilities between male and female students, according to the results. In these two studies, no variations in CT abilities were discovered between male and female students. According to Zetriuslita, Ariawan and Nufus(2016) Male students were able to generalize the abilities to complete the given data at a high degree of ability and are not yet able to define and explain the definition and evaluate although female students already have the ability to understand and explain the

definition and the ability to generalize and not to evaluate. Male and female students exhibit common symptoms at the stage of moderate skill, which do not yet include the ability to recognize and explain the idea, the ability to generalize, and the ability to evaluate. Although male and female students both displayed similar symptoms at a low level of skill, who do not yet have the ability to recognize and justify the idea, the ability to generalize, and the ability to interpret. As a result, they said that critical thinking skills differed slightly. between male and female responses and its support with the finding of current study and as the researcher also find that gender were not show any difference about critical thinking skills at Islamabad's public universities.

According to the findings of the current research, there is no statistically significant gap between how female and male students view the five critical thinking skills. Gender were not show any difference about interpretation at university level students. Such findings support the results ofFernandi1, Firman and Rusyati (2018) study which were held on 9^{th} class students in Indonesia that there was no statistically significance difference among students regarding interpretation and inference on the basis of gender. The result of this study also shows that mean score of respondents were Male (M= 60.99) and female (M=63.49)Both groups were at a moderate level and the overall logical thinking capacity to use evidence, use definitions, and allow interpretation and inference in this study. On the other hand Shubina and kulakli (2019) indicated in their result that there were no significant difference of interpretation skills among students on the basis of gender. Inference, deduction, interpretation, recognition of assumptions, critical thinking, argument and evaluation were the study's primary goals. And the result also shows that they did not found any superiority in gender regarding the critical thinking skills.

Findings from the current study analysis skills indicate that there were no statistically significant difference of students of public universities of Islamabad linked to analysis on the basis of gender. According to result of Mawaddah, Ahmad, and Duskri (2018) study related to students critical thinking skill test on the basis of gender for analysis indicator, Students correctly answer the problem and examine the problem properly. its indicate that there is no affect of gender regarding the critical thinking skill of analysis. But this study also reveals that all male did not use proper approaches to solve the problem properly. Verawatia, Arifina, Idrisa ,Azaheen, and Hamida (2010). This research aims was assess the potential of male and female students aged 16-17 in Malaysia to think critically. They indicated that there was no significant difference analysis of students on the basis of gender. There was no difference found on the basis of gender and its finding support with the finding of current research.

According to the findings of the third critical thinking ability, argumentation, the researcher found no statistically significant differences between students related to argumentation on the basis of gender..The deduction is defined as an argument that the conclusions can logically explain the inference (Edmonds, 2005).Shubina and kulakli (2019) indicated in their result that there is no difference among argumentation in students but there is little difference among male and female argumentation skills. female argumentative skills is higher than the male but male argument showed with creativity. Bagheri and Ghanizadeh (2016) revealed in their study interrelationships of these variables were found to occur The following are the associations between self-monitoring and inference-making (r= 0.353), self-monitoring and deduction (r= 0.350), and deduction and inference-making (r= 0.389). Gender did not play a role in students' inference-making, deduction, or self-monitoring, on the other hand.

Finding related to the fourth skill of critical thinking evaluation shows that a there were no significant difference was not found between both students of public universities of Islamabad related to evaluation on the basis of gender. The current also indicate the slightly difference among male and female evaluation skills. In the support of Perdana, Budiyono, Sajidan, and Sukarmin (2019) study indicated that there was no significant difference among students on the basis of gender and study also indicated that male are better critical thinker rather than female regarding evaluation skill. In the study of Mawaddah, Ahmad, and Duskri (2018) Male and female students correctly access the relation between the argument and reject a hypothesis based on predetermined criteria, according to the results of the student critical thinking skills test for evaluation indicators, but neither male subject could use the correct technique to solve the problem. On the other hand Leach (2011) study also indicated that there is no statistically significant among college students by gender linked to evaluation.

According to the findings of the current research, there is no significant difference in inference skills between Male (M) and Female (F) students studying in Islamabad Public universities. The researcher also discovered that there was no gender disparity in inference at the university level when comparing male and female students. Leach (2011) study findings showed that for the Inference factor, the primary influence of college was significant. A Turkey test could not be used so equal differences could not be believed. This research also found that there is no statistically significant difference between male and female college students when it comes to inference. Shubina and kulakli (2019) also indicated in their result that there is no difference among inference in students but there is little difference among male and female inference skills that support to finding of current research.

5.4 Conclusions

The conclusion was based on the findings of study.

Researcher attempted to explore practices and compare the Critical thinking skill among public university students of Islamabad on the basis of gender. The primary and first findings of the study showed the practices related to critical thinking skills. It was concluded through findings that student's remarks regarding skills were neutral that's why findings indicated that they were undecided about their critical thinking skills practices in university. These critical thinking skills were asked through questionnaire. (interpretation, Analysis, Argumentation, evaluation, and Inference). As a result of findings it were concluded that the majority of students at the public universities were undecided about their practices of critical thinking skills.

Further it was concluded that findings related to comparison of interpretation, analysis, argumentation, evaluation, and inference on the basis of gender. From the finding it was found that there were no statistically significant difference in critical thinking skills between male and female students at universities in Islamabad on the basis of gender and it is also observed that there was no statistically significant difference found regarding the critical thinking skills among university students. It is also observed that students were not aware about critical thinking skills practices in the university. The researcher accomplished that there were no statistically difference were found among the students on the basis gender and researcher did not found any difference in the term of interpretation, analysis, argumentation, evaluation and inference among students.

In general study were proved that students were undecided about their practices related to critical thinking skill and there was no statistically significant found on the basis of gender among university students of Islamabad. Moreover these skills were important to enhance in students at

university level. The critical thinking skills were also important in educational needs and the knowledge depends on the content and the context. Students enhance their skills through their existing knowledge through practicing these skills through their educational activities.

5.5 Recommendations

In this study Recommendation were based on findings and conclusion. Following recommendation were suggested below.

5.5.1 Recommendations for Teachers and organizations

As results of the study indicated, the ability for critical thinking in everyday life is very important. We faced a lot of phenomena in which we need to criticize everyday life task. Especially, Students as the younger generation of the country everyday they needed to criticize. For that, lecturers need to be design by teaching materials that facilitate students and enhance students' critical thinking skills through practicing these skills (interpretation, analysis, argumentation, evaluation and inference). So the educational organization (School, colleges and universities) may focus more to develop critical thinking skills among students. The following steps can be taken by institutions and instructors about teaching methods in this regard.

1. For developing interpretation skills teacher may share classroom where critical thinking skills are demonstrated through videotaped.
2. Teachers may incorporate analysis skills through content (course) in classroom by practicing for developing these skills in students by giving assignments, projects, presentations etc.

3. Teachers may encourage the importance of argumentation skills by awareness in the classroom at a higher level rather than at a lower level by discussion, quizzes and test.
4. Higher Education commission may arrange trainings for instructors about applying proper diagnostic intervention to assess the progress of (CTS) for the expansion of student evaluation skills. Intervention like questions, situation to find out the ways regarding real life problems.
5. Teachers may provide proper feedback on their given task to students through intervention like teachers observe critical thinking level of learner so that they may develop inference skills and practice it in their everyday life so that they practice critical thinking skills.
6. Organization of curriculum wing may establish a roadmap and program redesign to ensure that all new students receive comprehensive training for developing inference skills through course and content that may be applied to a number of scenarios to encourage inference by different ways like debate in classes, provide access to diverse quality reading material, help them learn from every things.
7. Critical Thinking may taught as a separate subject or course in their organization at all level with implementing rubrics for critical thinking
8. Teachers may use Socratic approach for delivering their lectures, the inquiry method, the problem-solving method to develop and enhance analysis thinking skills in learners.
9. Developing critical thinking skills play very significant role in educational period. It is recommended that higher educational institutions may arrange

seminars and workshops on the theme of critical thinking skills. As there are many theories of critical thinking skills are available on internet but it will change according to courses by using answer questions session according to topic to enhance critical thinking by 6 critical questions (Who, What, Where, When, Why, How).

5.5.2 Recommendations for Future Researchers

The researcher was given following recommendations to future researchers.

1. In future studies, various tests related to critical thinking abilities may be used to detect the expansion of critical thinking skills.
2. As sample size of study is relatively small, by testing among large sample sizes, future researchers may draw more relevant inferences.
3. Future researchers should acknowledge that, because the current study was restricted to public sector universities in Islamabad, the same study may conducted with private university samples.
4. Multiple different instruments, like including open-ended questions , essays , interviews , observations , and discipline-specific methods created by teachers or researchers are often used by future researchers. In this way they can find and describe the critical thinking skill with different result.
5. The current analysis focused on the gender-based comparison of university student critical thinking skills future studies may also apply some other demographic variables to their sample, such as age, tenure of jobs, and educational history.
6. Because of limited resources available, the current study only represents the critical thinking skills of a particular population in a specific area; however, future

studies with larger sample sizes may reveal different findings about critical thinking skills in different cultures.

7. It is also suggested that future researchers have several other variables in addition to critical thinking skills, such as creating, applying, and fully understanding.
8. Future research may use this tool for researches regarding critical thinking skills.

5.6 Limitations of the Study

The current study were conducted to explore and compare the critical thinking skills among university students. All the boundaries related to research were not covered successfully due to COVID pandemic in the country. It was difficult to collect data from university so researcher only collected to data only from those universities which gave permission to collect the data and researcher also tried to collected data online. Researcher was not face any limitation related to time.

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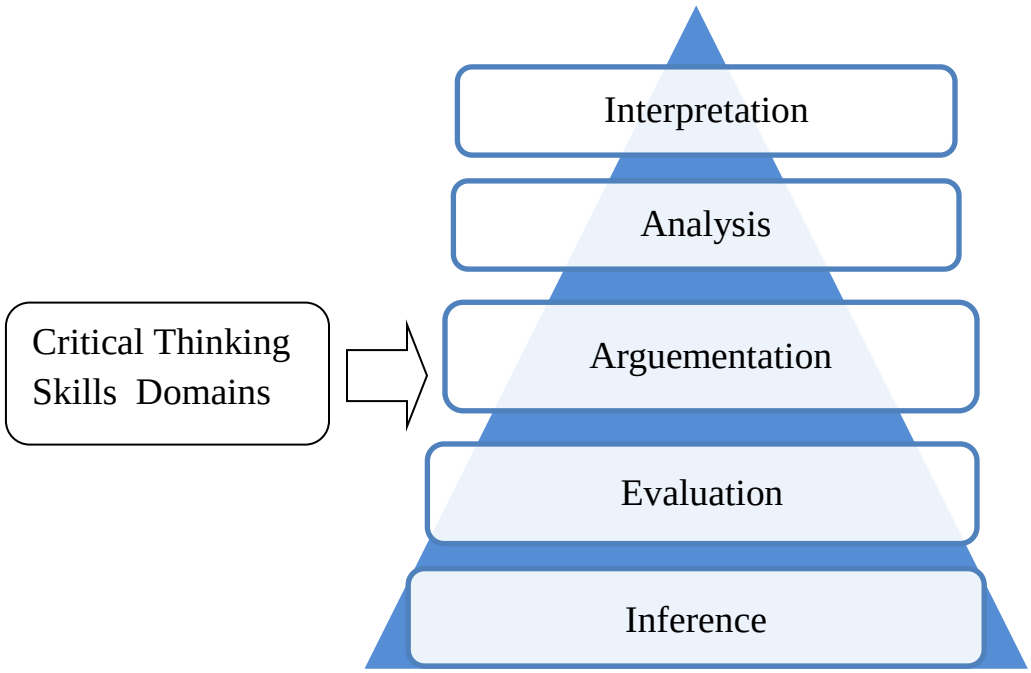
Appendix- A

Theoretical Framework



Theoretical framework of the study Elena, Rave, Gabriel, Monsalve, Andrés, Botero and Brand, (2017).

Appendix-B

Topic Approval Letter

NATIONAL UNIVERSITY OF MODERN LANGUAGES
FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF EDUCATION

ML.1-4/2020/Edu

Dated: 20-01-2020

To: **Laraib Mehdi,**
1511-MPhil/Edu/S18

Subject: **APPROVAL OF MPHIL THESIS TOPIC AND SUPERVISOR**

1. Reference to Minute Sheet No. ML.1-2/2020-Edu dated 02-1 -2020, the Higher Authority has approved your topic and supervisor/s on the recommendation of Faculty Board of Studies vide its meeting held on 15th Oct 2019.

a. **Supervisor's Name & Designation**
Dr. Quratul Ain Hina
Assistant Professor, Department of Education
NUML, Islamabad.

b. **Topic of Thesis**

Gender Based Comparative Study of Critical Thinking Skills among University Students

2. You may carry out research on the given topic under the guidance of your Supervisor/s and submit the thesis for further evaluation within the stipulated time. It is to inform you that your thesis should be submitted within the prescribed period by **31st Jan 2021** positively for further necessary action please.

3. As per policy of NUML, all MPhil/PhD theses are to be run through Turnitin by QEC of NUML before being sent for evaluation. The university shall not take any responsibility for high similarity resulting due to thesis prior run by any other individual.

4. Thesis is to be prepared strictly on NUML's format that can be taken from the MPhil & PhD Coordinator, Department of Education.

Telephone No: 051-9265100-110 Ext: 2090
E-mail: mdin@numl.edu.pk

Dr. Hukam Dad Malik
Head,
Department of Education

Cc to:
Dr. Quratul Ain Hina

Appendix-C

Cover Letter for Validity Certificates

Gender Based Comparative Study of Critical Thinking Skills among University Students

Subject: **Request for Validity Certificate**

Respected Sir/ Madam,

I have attached my questionnaire developed for the purpose of research title as "gender based comparative study of critical thinking skills among university students". I have developed it in the light of the Model presented by Elena, Rave, Gabriel, Monsalve, Andrés, Botero & Brand (2017) critical thinking domain. This model has comprised five critical thinking domains as interpretation, analysis, argumentation, evaluation, and inference.

The following are the dimensions of the model. questionnaire construct are based on it.

1. Interpretation
2. Analysis
3. Argumentation
4. Evaluation
5. Inference

Kindly check my questionnaire, its content and construction, provide your valuable suggestions for its improvement and certify its validity by filling the certificate attached at the end of the document.

Laraib Mehdi

M.Phil Scholar, Deptt of Education,

National University of Modern Languages,

Islamabad, Pakistan

Appendix-D

Sample of Validity Certificate

CERTIFICATE OF VALIDITY

(Critical Thinking Skills Scale)

Gender based Comparative Study of Critical Thinking Skills among University Students'

By Miss Laraib Mehdi,

M.Phil Scholars, Department of Education, Faculty of Social Sciences

National University of Modern Languages (NUML), H-9, Islamabad Pakistan

This is certify that the questionnaire developed by the scholar towards her thesis has been assessed by me and I find it to have been designed adequately to exploration of critical thinking skills among university students' based on five dimensions (Interpretation, Analysis Argumentation, Evaluation and Inference).

It is considered that the research instrument, developed for the above mentioned title and its according to objective and hypotheses of the research, assures adequate construct and content validity according to the purpose of research, and can be used for data collection by the researcher with fair amount of confidence.

Name _____

Designation _____

Institution _____

Signatures _____

Date _____

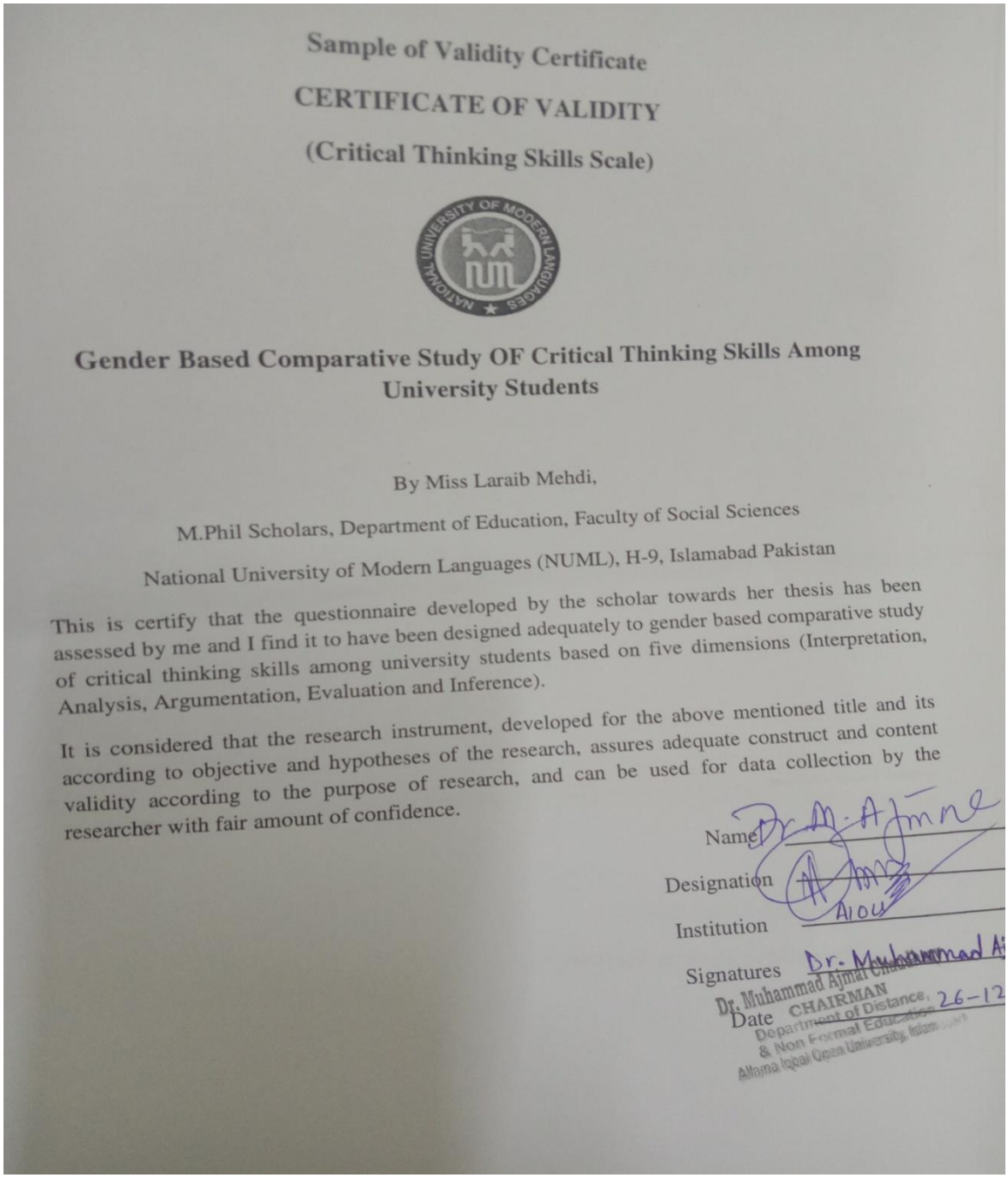
Appendix-E

List of Expert Committee for Tool Validation

Expert Name	Designation	Institute name
Dr. M Ajmal Chaudhary	Chairman Department of Distance &Non Formal Education	Allama Iqbal Open University Islamabad
Dr. Imran Yousuf	Chairman Department of Education	PMAS-Arid Agriculture University Rawalpindi
Dr.Shazia Naween	Assistant Professor	International Islamic University Islamabad
Dr. Shazia Zamir	Assistant Professor	National university Of Modern Languages Islamabad
Dr. Malik Ghulam Behlol	Incharge HOD Department of Education	Fatima Jinnah Women University Rawalpindi

Appendix-F

Research Instrument Validity Certificate



Sample of Validity Certificate

CERTIFICATE OF VALIDITY

(Critical Thinking Skills Scale)

Gender Based Comparative Study OF Critical Thinking Skills Among University Students

By Miss Laraib Mehdi,

M.Phil Scholars, Department of Education, Faculty of Social Sciences

National University of Modern Languages (NUML), H-9, Islamabad Pakistan

This is certify that the questionnaire developed by the scholar towards her thesis has been assessed by me and I find it to have been designed adequately to gender based comparative study of critical thinking skills among university students based on five dimensions (Interpretation, Analysis, Argumentation, Evaluation and Inference).

It is considered that the research instrument, developed for the above mentioned title and its according to objective and hypotheses of the research, assures adequate construct and content validity according to the purpose of research, and can be used for data collection by the researcher with fair amount of confidence.

Name

Designation

Institution AIOU

Signatures

Dr. Muhammad Ajmal

Date

CHAIRMAN
Department of Distance,
& Non Formal Education
Allama Iqbal Open University, Islam

Sample of Validity Certificate

CERTIFICATE OF VALIDITY

(Critical Thinking Skills Scale)

Gender Based Comparative Study OF Critical Thinking Skills Among University Students

By Miss Laraib Mehdi,

M.Phil Scholars, Department of Education, Faculty of Social Sciences

National University of Modern Languages (NUML), H-9, Islamabad Pakistan

This is certify that the questionnaire developed by the scholar towards her thesis has been assessed by me and I find it to have been designed adequately to gender based comparative study of critical thinking skills among university students based on five dimensions (Interpretation, Analysis, Argumentation, Evaluation and Inference).

It is considered that the research instrument, developed for the above mentioned title and its according to objective and hypotheses of the research, assures adequate construct and content validity according to the purpose of research, and can be used for data collection by the researcher with fair amount of confidence.

Name Dr Imran Yousaf

Designation Chairman DOE

Institution Arid

Signatures

Date 23/12/2019

CHAIRMAN
Department of Education
PMAS-Arid Agriculture University
Rawalpindi

Sample of Validity Certificate

CERTIFICATE OF VALIDITY

(Critical Thinking Skills Scale)

Gender Based Comparative Study OF Critical Thinking Skills Among University Students

By Miss Laraib Mehdi,

M.Phil Scholars, Department of Education, Faculty of Social Sciences

National University of Modern Languages (NUML), H-9, Islamabad Pakistan

This is certify that the questionnaire developed by the scholar towards her thesis has been assessed by me and I find it to have been designed adequately to gender based comparative study of critical thinking skills among university students based on five dimensions (Interpretation, Analysis, Argumentation, Evaluation and Inference).

It is considered that the research instrument, developed for the above mentioned title and its according to objective and hypotheses of the research, assures adequate construct and content validity according to the purpose of research, and can be used for data collection by the researcher with fair amount of confidence.

Name Dr. Shazia Nawe

Designation Assist. Prof.

Institution International Isla University Isla

Signatures

Date 2-Jul 2020

Department of Education
Faculty of Social Sciences
International Islamic University
Islamabad

0349019841

Sample of Validity Certificate

CERTIFICATE OF VALIDITY

(Critical Thinking Skills Scale)

Gender Based Comparative Study OF Critical Thinking Skills Among University Students

By Miss Laraib Mehdi,

M.Phil Scholars, Department of Education, Faculty of Social Sciences

National University of Modern Languages (NUML), H-9, Islamabad Pakistan

This is certify that the questionnaire developed by the scholar towards her thesis has been assessed by me and I find it to have been designed adequately to gender based comparative study of critical thinking skills among university students based on five dimensions (Interpretation, Analysis, Argumentation, Evaluation and Inference).

It is considered that the research instrument, developed for the above mentioned title and its according to objective and hypotheses of the research, assures adequate construct and content validity according to the purpose of research, and can be used for data collection by the researcher with fair amount of confidence.

Name Dr. Shazia

Designation Assistatant Professor

Institution NUML

Signatures

Date Feb 6, 2020

Sample of Validity Certificate

CERTIFICATE OF VALIDITY

(Critical Thinking Skills Scale)

Gender Based Comparative Study OF Critical Thinking Skills Among University Students

By Miss Laraib Mehdi,

M.Phil Scholars, Department of Education, Faculty of Social Sciences

National University of Modern Languages (NUML), H-9, Islamabad Pakistan

This is certify that the questionnaire developed by the scholar towards her thesis has been assessed by me and I find it to have been designed adequately to gender based comparative study of critical thinking skills among university students based on five dimensions (Interpretation, Analysis, Argumentation, Evaluation and Inference).

It is considered that the research instrument, developed for the above mentioned title and its according to objective and hypotheses of the research, assures adequate construct and content validity according to the purpose of research, and can be used for data collection by the researcher with fair amount of confidence.

Name Dr. Malik Ghulam Behlol

Designation HOD

Institution FJWU

Signatures

Date 2-1-2020

Department of Education
Fatima Jinnah Women University
Rawalpindi

Appendix-G

Population of the study

S#	University	Total Students	Male	Female
1.	National University of Modern Languages	1994	1155	839
2	International Islamic University Islamabad	2200	1194	1006
3	Quaid -i- Azam University	245	130	115
4.	Bahria University	877	373	504
5.	COMSATS Institute of Information Technology	155	115	40
6.	Federal Urdu University of Arts, Sciences &Technology	392	282	110
7.	National University of Sciences & Technology	215	188	27
8.	Pakistan Institute of Development Economics (PIDE)	298	171	127
9.	Allama Iqbal Open University	1750	878	872
10.	National Defence University	378	204	174
11.	Air University	155	105	50
Total		8659	4795	3864

The table explains the students numbers enrolled in social sciences department.

Appendix-H

HEC Recognised Universities and Degree Awarding Institutions

Name	Sector	Chartered By	Discipline	Province	City
Air University	Public	Government of Pakistan	General	Islamabad Capital Territory	Islamabad
Allama Iqbal Open University	Public	Government of Pakistan	General	Islamabad Capital Territory	Islamabad
Bahria University	Public	Government of Pakistan	General	Islamabad Capital Territory	Islamabad
COMSATS Institute of Information Technology	Public	Government of Pakistan	General	Islamabad Capital Territory	Islamabad
Federal Urdu University of Arts, Sciences & Technology	Public	Government of Pakistan	General	Islamabad Capital Territory	Islamabad
Institute of Space Technology	Public	Government of Pakistan	General	Islamabad Capital Territory	Islamabad
International Islamic University	Public	Government of Pakistan	General	Islamabad Capital Territory	Islamabad
National Defense University	Public	Government of Pakistan	General	Islamabad Capital Territory	Islamabad
National University of Modern Languages	Public	Government of Pakistan	General	Islamabad Capital Territory	Islamabad
National University of Sciences & Technology	Public	Government of Pakistan	General	Islamabad Capital Territory	Islamabad
National University of Technology (NUTECH), Islamabad	Public	Government of Pakistan	Engineering & Technology	Islamabad Capital Territory	Islamabad
Pakistan Institute of Development Economics (PIDE)	Public	Government of Pakistan	General	Islamabad Capital Territory	Islamabad
Pakistan Institute of Engineering & Applied Sciences	Public	Government of Pakistan	General	Islamabad Capital Territory	Islamabad
Quaid-i-Azam University	Public	Government of Pakistan	General	Islamabad Capital Territory	Islamabad
Shaheed Zulfiqar Ali Bhutto Medical University	Public	Government of Pakistan	Medical	Islamabad Capital Territory	Islamabad

Appendix-I

Research Instrument

Serial No: _____

Gender Based Comparative study of Critical Thinking Skills among University Students

Dear Respondent,

I am M Phil scholar (Education) conducting a research on above mentioned topic. I request you to fill this attached questionnaire. The questionnaire have two parts Part-A and Part-B. The Part-A consist of demographic information and the Part-B deals with the critical thinking skills among university students.

This questionnaire has been made for a research purpose. I will keep your responses confidential. I respect your autonomy and dignity.

Laraib Mehdi
M.Phil Scholar (Education)
Department of Education,
National University of Modern Languages,
Islamabad, Pakistan

PART-A

DEMOGRAPHICS:

1.	Gender	Male 1		Female 2	
2.	Grade/ Level	Bs 1	M.S 2	M.Phil/Ph.D 3	
3.	Age	20-30 1	31-40 2	41-50 3	51-60 4
4.	Last exams percentage	0-25% 1	25-50% 2	50-75% 3	75-100% 4
5.	Background	Rural 1		Urban 2	
6.	Educational round of s	Educated 1		Non Educated 2	

INSTRUCTIONs:

Read the Questionnaire carefully. Mark the option appropriately and show your sincerity. Please mark your responses against 5 to 1 that indicate your response like (5=Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree).

PART-B

Critical Thinking Skills

Critical Thinking Skills Scale							
Sr No.	**Code**	**i. Interpretation** The process of expressing thoughts in artistic style.	**SD**	**D**	**N**	**A**	**SA**
1	IN1	I can easily comment on my class fellows ideas in class discussion.	1	2	3	4	5
2	IN2	I can organize my ideas for my understanding in class.	1	2	3	4	5
3	IN3	I can differentiate between main ideas and sub ideas which I learned in class.	1	2	3	4	5
4	IN4	I can summarize the knowledge which I have.	1	2	3	4	5
5	IN5	I can easily express my idea in classroom.	1	2	3	4	5
6	IN6	I use pictures and diagram to express my ideas in class.	1	2	3	4	5
7	IN7	I can describe the lecture in my own words.	1	2	3	4	5
8	IN8	I can explain the concepts I have learned in class.	1	2	3	4	5
9	IN9	I can easily take notes of important key points during lecture.	1	2	3	4	5
10	IN10	I can draw conclusion from lesson I learned	1	2	3	4	5
11	IN11	I sometimes question the way others do something and try to think of a better way.	1	2	3	4	5
12	IN12	I often think on my actions to improve my studies.	1	2	3	4	5
13	IN13	I can concentrate on lesson for making my concepts clear.	1	2	3	4	5
14	IN14	I share my knowledge with my fellows in better way.	1	2	3	4	5
15	IN15	I can accept and reject an idea as per my understanding.	1	2	3	4	5
		ii. Analysis The development of making logical thinking between evidence and reasoning.	**SD**	**D**	**N**	**A**	**SA**
16	AN1	I can compare two different ideas while discussion in class.	1	2	3	4	5
17	AN2	I can contrast two different ideas while discussion in class.	1	2	3	4	5
18	AN3	I can find out the links between concepts.	1	2	3	4	5

19	AN4	I use mind mapping to understand the lesson.	1	2	3	4	5
20	AN5	I can break down complex ideas into simple.	1	2	3	4	5
21	AN6	I develop graphics descriptions from the content I learned.	1	2	3	4	5
22	AN7	I can write important key points from the lesson.	1	2	3	4	5
23	AN8	I can breakdown the lesson for extracting key ideas.	1	2	3	4	5
24	AN9	I can breakdown information to solve problems.	1	2	3	4	5
25	AN10	I inspect the things logically in the class.	1	2	3	4	5
26	AN11	I rethink my experiences to develop solutions of complex problems in the class	1	2	3	4	5
27	AN12	I analyze the topic I learned in the class while discussion.	1	2	3	4	5
28	AN13	I have ability to present creative choices and solutions in the class	1	2	3	4	5
29	AN14	I rethink my statements for accepting or rejecting content I learned in the class.	1	2	3	4	5
30	AN15	I make out conclusion from statements which are discussed in the class.	1	2	3	4	5
		iii. Argumentation Selecting and presenting the thoughts in logical way is the process of argument to convey the own message.	**SD**	**D**	**N**	**A**	**SA**
31	A1	I clearly present my point of view during discussion in class.	1	2	3	4	5
32	A2	I can defend my position during discussion in class.	1	2	3	4	5
33	A3	I can answer the questions asked about my point of view.	1	2	3	4	5
34	A4	I clearly make arguments on the basis of facts and knowledge from the class l learned.	1	2	3	4	5
35	A5	I give suggestions to others classmates based on my knowledge.	1	2	3	4	5
36	A6	I consider others class fellows point of view when they argue about the topic we learned	1	2	3	4	5
37	A7	I can clear my arguments with easy discussion in class.	1	2	3	4	5
38	A8	I often use easy alternative statements to clear my arguments in front of others in class.	1	2	3	4	5
39	A9	I always focus on questions first before giving answers.	1	2	3	4	5
40	A10	I explain points clearly when someone does not	1	2	3	4	5

		understand it.					
41	A11	I always summarize my statements in clear way.	1	2	3	4	5
43	A12	I appreciate other's ideas before presenting my ideas in class.	1	2	3	4	5
43	A13	I change my arguments with new valid information.	1	2	3	4	5
44	A14	I organize my thoughts before arguing in the class.	1	2	3	4	5
45	A15	I argue about the topic through easy to complex ways for better understanding of others in class.	1	2	3	4	5
		iv. Evaluation This is way to organize the information and then analyze to come on result.	**SD**	**D**	**N**	**A**	**SA**
46	E1	I critically examine the information I learned in the class.	1	2	3	4	5
47	E2	I make clear judgments about true or false from the content I learned	1	2	3	4	5
48	E3	I enable to judge others opinions.	1	2	3	4	5
49	E4	I cut down my concepts on the basis of result in the class.	1	2	3	4	5
50	E5	I reframe the important content according to situation in class.	1	2	3	4	5
51	E6	I can easily review that the content I learned is truthful	1	2	3	4	5
52	E7	I can easily judge that the topic I learned is important.	1	2	3	4	5
53	E8	I use discussion method to validate my points.	1	2	3	4	5
54	E9	I can easily judge the authenticity of information.	1	2	3	4	5
55	E10	I can take decisions while working in a group.	1	2	3	4	5
56	E11	I can discriminate among positive and negative point of view of others	1	2	3	4	5
57	E12	I always appreciate others decisions.	1	2	3	4	5
58	E13	I can plan positive strategy to improve my knowledge.	1	2	3	4	5
59	E14	I can appraise strengths about the content I learned in the class.	1	2	3	4	5

60	E15	I can assess weakness about the content I learned in the class	1	2	3	4	5
61	E16	I can easily identify that the information I used is accurate.	1	2	3	4	5
		V. Inference This process of reasoning is based on what we actually know and its focus on facts which we think and make valuable conclusion	**SD**	**D**	**N**	**A**	**SA**
62	I1	I can predict future events based on my previous experiences in group task.	1	2	3	4	5
63	I2	I identify gaps in my knowledge and inquire information about content I learned.	1	2	3	4	5
64	I3	I consider various options to solve a problem during group task in class.	1	2	3	4	5
65	I4	I double check information for its accuracy.	1	2	3	4	5
66	I5	I reach on conclusions rather than let myself doubtful by the opinions of others.	1	2	3	4	5
67	I6	I research about the knowledge to enhance my understanding.	1	2	3	4	5
68	I7	I consider all options and try out where it takes to.	1	2	3	4	5
69	I8	I explore alternative solution to make conclusion.	1	2	3	4	5
70	I9	I am able to take out mistakes in my previously learned information.	1	2	3	4	5
71	I10	I use different sources to resolve problems in the class.	1	2	3	4	5
72	I11	I reflect on the things which I learned for making clear judgment.	1	2	3	4	5
73	I12	I draw conclusion using alternative ways in doing task in class.	1	2	3	4	5
74	I13	I question universally to come on the valuable ends in doing classroom tasks.	1	2	3	4	5
75	I14	I discuss about the content I learned with many people before making conclusions.	1	2	3	4	5

76	I15	I deeply observe all the information before making key points during group activities in class.	1	2	3	4	5

77. What does critical thinking means to you?

78. How important is critical thinking to you?

Appendix-J

List of social sciences disciplines

HIGHER EDUCATION COMMISSION
H-9, Islamabad (Pakistan)
Phone: (051) 90402116, Fax: (051) 90402102,
E-mail: tshah@hec.gov.pk

No. DD/SS&H/CDSSHP/List/2015 Dated: 3rd February 2015

NOTIFICATION

It is hereby to notify all concerned that the list of subjects for disciplines of Social Sciences, Arts & Humanities and Business Education has been revised and stated below:

Social Sciences

- Archeology
- Anthropology
- Archival Studies
- Economics
- Econometrics
- Disaster Economics
- Political Science
- Public Administration
- Defence & Strategic Studies
- International Relations
- Psychology including Clinical, Industrial, Developmental Psychology
- Philosophy
- Sociology
- Iqbal Studies / Iqbaliyat
- Rural Development Studies
- Social Work
- Criminology
- Library and Information Sciences
- History
- Demography and Population Studies
- Ethnography
- Conservation Studies
- Religious Studies / Comparative Religion
- Islamic Studies / Arabic Studies
- Education
- Special Education
- Law and Legislature
- Home Economics
- Pakistan Studies
- Peace & Conflict Studies
- Behavioral Sciences
- Women and Gender Studies
- American Studies
- Area Studies
- Development Studies
- Journalism
- Mass communication
- Media Studies
- Rural / Urban Studies
- Women Studies

Arts & Humanities

- Fine Arts
- Liberal Arts
- Photography
- Performing Arts
- Musicology
- Film / Film Production
- Physical Education and Sports
- Languages and Literature
- Translation Studies
- Museology (Museum Science)
- Curatorial Studies
- Design
- History of Art & Design
- Architecture
- Urban & Town Planning
- Pedagogy of Arts & Design
- Visual Arts

Business Education

- Finance all subjects including
  - Accounting
  - Public Finance
- Business Administration/Studies
- Organization Science
- Operations Research & Supply Chain
- Marketing
- Finance
- Banking
- Commerce
- Administrative Sciences
- Management Information Systems
- Skills Development
- Industry Focused Disciplines
- Management Sciences:
  - Human Resource Management/Human Resource Development
  - Financial Management
  - Marketing Management
  - Management
  - Quality Management
  - Project Management
  - Disaster and Risk Management
  - Hotel Management
  - Services Management

Note: - Other related subjects can be added after confirmation from the experts in the relevant disciplines.

With Best Regards,

3-2-2015

Dr. Muhammad Tahir Ali Shah
Dy. Director (Academics) / Focal Person (Social Sciences & Humanities)
Higher Education Commission, Sector H-9, Islamabad.
Ph : 90402116, Fax : 90402102
Email : tshah@hec.gov.pk

Appendix-K

Revised Instrument through Factor Analysis

Serial No: _____

INSTRUCTIONs:

Read the Questionnaire carefully. Mark the option appropriately and show your sincerity. Please mark your responses against 5 to 1 that indicate your response like (5=Strongly Agree, 4= Agree, 3= Neutral, 2= Disagree, 1= Strongly Disagree).

Critical Thinking Skills

Critical Thinking Skills Scale							
Sr No.	**Code**	**i.Analysis** The development of making logical thinking between evidence and reasoning.	**SD**	**D**	**N**	**A**	**SA**
1		I consider others class fellow point of view when they argue about the topic we learned.	1	2	3	4	5
2		I deeply observe all the information before making key points during group activities in class	1	2	3	4	5
3		I draw conclusion using alternative ways in doing task in class.	1	2	3	4	5
4		I rethink my statements for accepting or rejecting content I learned in the class.	1	2	3	4	5
5		I can easily judge the authenticity of information.	1	2	3	4	5
6		I can easily judge the topic I learned is important.	1	2	3	4	5
7		I appreciate other's ideas before presenting my ideas in class.	1	2	3	4	5
8		I can clear my arguments with easy discussion in class.	1	2	3	4	5
9		I can easily review that the content I learned is truthful	1	2	3	4	5
10		I clearly make arguments on the basis of facts and knowledge from the class I learned.	1	2	3	4	5
11		I always focus on questions first before giving answers.	1	2	3	4	5
12		I discuss about the content I learned with many people before making conclusion.	1	2	3	4	5
13		I use discussion method to validate my points.					
14		I explain points clearly when someone does not understand it.	1	2	3	4	5
15		I always appreciate others decisions.	1	2	3	4	5

16		I reframe the important content according to situation in class.	1	2	3	4	5
17		I can take decisions while working in a group.	1	2	3	4	5
18		I analyze the topic I learned in the class while discussion.	1	2	3	4	5
19		I can discriminate among positive and negative point of view of others.	1	2	3	4	5
20		I always summarize my statements in clear way.	1	2	3	4	5
		ii. Inference This process of reasoning is based on what we actually know and its focus on facts which we think and make valuable conclusion.	**SD**	**D**	**N**	**A**	**SA**
21		I develop graphics descriptions from the content I learned.	1	2	3	4	5
22		I double check the information for its accuracy.	1	2	3	4	5
23		I am able to take out mistakes in my previously learned information.	1	2	3	4	5
24		I reach on conclusion rather than let myself doubtful by the opinions of others.	1	2	3	4	5
25		I can assess weakness about the content I learned in the class.	1	2	3	4	5
26		I can explain the concepts I have learned in class.	1	2	3	4	5
27		I can breakdown information to solve problems.	1	2	3	4	5
28		I consider all options and try out where it takes to.	1	2	3	4	5
29		I make clear judgments about true or false from the content I learned.	1	2	3	4	5
30		I consider various options to solve a problem during group task in class.	1	2	3	4	5
31		I research about the knowledge to enhance my understanding.	1	2	3	4	5
32		I critically examine the information I learned in the class.	1	2	3	4	5
33		I enable to judge others opinions.	1	2	3	4	5
34		I argue about the topic through easy to complex ways for better understanding of others in class.	1	2	3	4	5
35		I inspect the things logically in the class.	1	2	3	4	5
36		I can describe the lecture in my own words.	1	2	3	4	5

37		I reflect on the things which I learned for making clear judgment.	1	2	3	4	5
38		I change my arguments with new valid information.	1	2	3	4	5
		iii.Interpretation The process of expressing thoughts in artistic style.	**SD**	**D**	**N**	**A**	**SA**
39		I can concentrate on lesson for making my concepts clear.	1	2	3	4	5
40		I can differentiate between main ideas and sub ideas which I learned in class.	1	2	3	4	5
41		I can summarize the knowledge which I have.	1	2	3	4	5
42		I can draw conclusion from lesson I learned.	1	2	3	4	5
43		I can appraise strengths about the content I learned in the class.	1	2	3	4	5
44		I identify gaps in my knowledge and inquire information about content I learned.	1	2	3	4	5
45		I explore alternative solution to make conclusion.	1	2	3	4	5
46		I can easily take notes of important key points during lecture.	1	2	3	4	5
47		I can find out the links between concepts.	1	2	3	4	5
48		I often think on my actions to improve my studies.	1	2	3	4	5
49		I cut down my concepts on the basis of results in the class.	1	2	3	4	5
50		I sometimes question the way others do something and try to think of a better way.	1	2	3	4	5
51		I use pictures and diagram to express my ideas in class.	1	2	3	4	5
52		I can write important key points from the lesson.	1	2	3	4	5
53		I have ability to present creative choices and solutions in the class.	1	2	3	4	5
54		I share my knowledge with my fellows in better way.	1	2	3	4	5
55		I can compare two different ideas while discussion in class.	1	2	3	4	5
56		I can plan positive strategy to improve my knowledge.	1	2	3	4	5
57		I use mind mapping to understand the lesson.	1	2	3	4	5
		iv.Evaluation This is way to organize the information and then analyze to come on result.	**SD**	**D**	**N**	**A**	**SA**

58		I can answer the questions asked about my point of view.	1	2	3	4	5
59		I clearly present my point of view during discussion in class.	1	2	3	4	5
60		I rethink my experiences to develop solutions of complex problems in the class.	1	2	3	4	5
61		I use different source to resolve problems in the class.	1	2	3	4	5
62		I can predict future events based on my previous experiences in group task.	1	2	3	4	5
63		I can breakdown complex ideas into simple.	1	2	3	4	5
64		I can breakdown the lesson for extracting key ideas.	1	2	3	4	5
65		I organize my thoughts before arguing in the class.	1	2	3	4	5
66		I often use easy alternative statements to clear my arguments in front of others in class.	1	2	3	4	5
67		I can easily identify that the information I used is accurate.	1	2	3	4	5
68		I can accept and reject an idea as per my understanding.	1	2	3	4	5
69		I can defend my position during discussion in class.	1	2	3	4	5
		V Argumentation Selecting and presenting the thoughts in logical way is the process of argument to convey the own message.	**SD**	**D**	**N**	**A**	**SA**
70		I can easily express my idea in classroom.	1	2	3	4	5
71		I give suggestions to others classmates based on my knowledge.	1	2	3	4	5
72		I can easily comment on my class fellows ideas.	1	2	3	4	5
73		I question universally to come on the valuable ends in doing classroom tasks.	1	2	3	4	5
74		I can contrast two different ideas while discussion in class.	1	2	3	4	5
75		I make out conclusion from statements for accepting or rejecting content I learned in the class.	1	2	3	4	5

76		I can organize my ideas for my understanding in class.	1	2	3	4	5

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