# CHAPTER-1

## STATEMENT OF THE PROBLEM & DEFINITION OF THE TERMS

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1.1 INTRODUCTION

The demand society places on students today and, consequently, on schools, have expanded considerably. Students are under pressure to learn enormous amounts of course content in usually very little time. Today, in constantly changing technological world, it is impossible for individuals to acquire all existing knowledge, but it is also difficult to envisage what knowledge will be essential for future. Thus, although education offers incredible rewards, to reap them, students, their teachers, and parents will need to successfully meet many challenges, which begin in early grade school and continue through college and sometimes beyond. To meet these challenges, education research seeks to understand how students learn and reason as well as how to improve their learning and reasoning. Of course, such research has led to the discovery of many techniques that can improve student scholarship.

The concept of metacognition has recently become a popular area in education. Researchers and educators are deeply concerned about the type and levels of knowledge children are acquiring in schools. Passive transmission-reception of information and memorization of facts are not the kinds of learning that will be required for success in future. The students will be expected to think critically about what they have heard and read, identify relationships among ideas, engage in complex decision making and monitor their own thought processes. Studies explicitly show that metacognitive skills play an important role in effective learning that leads to academic success.

Metacognition has application for many arenas of school success. The essence of metacognition is awareness of one's cognitive processes, as well as an ability to develop a plan for achieving a goal and evaluating one's effectiveness of reaching that goal. The importance of metacognition for high quality learning and problem solving is widely accepted. For example, experts, as well as possessing deep understanding of their specific subject areas, have also been found to be highly metacognitive.
Brown (1994) suggested that learners can maximize their leaning success when they have access to their learning repertoires in addition to insights into their own capabilities. Not surprisingly therefore, it has been suggested that, if students metacognition can be improved, then it should be possible to improve their learning outcomes. Such a position provides an optimistic outlook on education. Moreover a review study by Wang, Haertel and Walberg (1990) revealed metacognition to be a most powerful predictor of learning.

Thus, in the field of educational research, researches regarding metacognition are very useful. In order to understand metacognitive processes better, individual differences in metacognitive activities should be examined. And for that purpose it is necessary to know or identify the level of student's metacognition. That is the reason, why the investigator has selected the problem.

1.2 STATEMENT OF THE PROBLEM

The investigator has decided to construct and standardize a suitable tool to assess the metacognition. The title of the present study is,

"Construction and Standardization of a Metacognition Inventory for the Students of Secondary Schools and Study of Metacognition in Context of Some Variables"

1.3 DEFINITION OF THE KEY WORDS

In order to avoid misunderstanding, it is necessary to define the key words of the problem, so investigator has defined the key words of the problem below:

• Construction : The Merriam-Webster's online Dictionary\(^1\) (2011), gives the meaning as,

"The arrangement and connection of words or groups of words in a sentence: syntactical arrangement"

According to Terry & Thomas\(^2\) (1977) construction means,

"Programmed instruction term for the construction of an answer either in writing or by performance actively, not by passive choice"
The term construction indicates the process or act of preparing of a new item or a thing. All the items to be used in the process of standardizing must be constructed.

- **Standardization**:

  According to Patel³ (2011),

  "Tests are subjected to stages of standardization and are therefore known as standardized tests."

  According to Hawes,⁴ (1982), Standardization means,

  "An objective test accompanied by tables of norms important for score interpretations, with the norms having been obtained by giving the test to validity representative groups of persons of the types for which the test is designed, the process of obtaining such norms is called standardization"

  Cronbach,⁵ (1984) defined it as,

  "A standardized test is one which the procedure, apparatus and scoring have been fixed. So that precisely the same test can be given at different times and places"

  According to Anastasi & Urbina⁶ (2002),

  "Standardization implies uniformity of procedure in administering and scoring the test"

  In the above definitions, a psychological test was described as standardized measure. Therefore, it is a process of establishment of fixed procedure of administrating and scoring a test and the establishment of the norms, reliability and validity of a test. Thus, it is a process of refining a measuring instrument through scientific procedures. When a measuring instrument passes through the procedure of standardization, it becomes a standardized instrument.

- **Metacognition**:

  Weinert⁷ (1987) describes metacognition as,

  "Second order cognitions: thoughts about thoughts, knowledge about knowledge or reflections about actions"
Flavell\(^8\) (1979) viewed metacognition as learner's knowledge of their own cognition, defining it as, "Knowledge and cognition about cognitive phenomena".

Nelson\(^9\) (as cited in Efklides, 2008) defined metacognition as, "A model of cognition that functions at a Meta level; metacognition represents the object level, that is cognition."

This definition underscores the functioning of metacognition at a "meta" level, which means that metacognition is a representation of cognition, and that metacognition and cognition are connected through the monitoring and control functions.

The concept of metacognition can be described as a higher-order cognitive structure, i.e. knowledge and processes that control, execute, and evaluate cognition. Metacognition is a superior system that encompasses a person's self-awareness of his/her cognitive functions and facts and that enables a person to purposefully direct these functions and facts. In other words, it's a person's knowledge about his/her own knowledge, thoughts about his/her own thoughts, and or eye on his/her own cognitive process.

**Inventory:**

Good\(^10\) (1973) defined inventory as, "In the field of evaluation, a test or checklist used to determine the subject's or examinee's ability, achievement, aptitude, interest or likes, generally in a limited area."

According to Terry & Thomas\(^11\) (1977), "General term for personality tests or questionnaires designed to expose personality characteristics."

According to Merriam-Webster's\(^12\) online Dictionary (2011), "A list of traits, preferences, attitudes, interests or abilities used to evaluate personal characteristics or skills."
In the present study the inventory means the list of the statements with five point rating scale related to the metacognition designed to assess the student's Metacognitive awareness.

- **Metacognition Inventory:**
  
  In the present study an inventory prepared by the investigator to assess the student's metacognition is known as Metacognition Inventory.

- **Secondary school:**
  
  Schools permitted to provide secondary education. (Secondary is from Standard 8 to Standard 10).

### 1.4 OBJECTIVES OF THE STUDY

The objectives of the present study were as follows:

- To construct and standardize two parallel forms of the metacognition inventory for the students of secondary schools of Gujarat State.
- To establish reliability and validity of the metacognition inventory for the students of the secondary schools of Gujarat State.
- To establish norms of the metacognition inventory for the students of secondary schools of Gujarat state.
- To study whether there exists any area difference with reference to the metacognition.
- To study whether there exists any sex difference with reference to metacognition.
- To study whether there exists any standard difference with reference to the metacognition.
- To study the effect of achievement level on the mean scores of Metacognition
- To study the effect of Intelligence level on the mean scores of Metacognition
1.5 VARIABLES OF THE STUDY

The demographic variables in the study are:

1.6 HYPOTHESIS OF THE STUDY

Hypotheses are eyes of research problems. According to Best & Kahn\textsuperscript{13} (1989),

"*The hypothesis focuses the investigation on a definite target and determines what observation or measures are to be used.*"

Kerlinger\textsuperscript{14} (1983) defined hypothesis as below,

"*A hypothesis is a conjectural statement of the relation between two or more variables.*"

After stipulating the objectives as well as the title of the research study the researcher proposes the solutions of the problem of his research on an adhoc basis in terms of statements which are called hypotheses. These hypotheses are to be tested or verified from the evidences available in the form of collected data.

In the present study the researcher had prepared two parallel forms of the Metacognition Inventory; namely Metacognition Inventory Form-A
(MCI-A) and Metacognition Inventory Form-B (MCI-B). Therefore, the researcher had to test the hypothesis for both the forms of the Inventory separately. The hypotheses to be tested for both the forms were same. Hypothesis in the present study were as follows:

**Hypotheses for Metacognition Inventory-A (MCI-A)**

**Hypotheses to test Gender effect**

$H_0_1$ There will be no significant difference between the mean scores of MCI-A of girls and boys of standard 8 of rural area.

$H_0_2$ There will be no significant difference between the mean scores of MCI-A of girls and boys of standard 9 of rural area.

$H_0_3$ There will be no significant difference between the mean scores of MCI-A of girls and boys of standard 10 of rural area.

$H_0_4$ There will be no significant difference between the mean scores of MCI-A of girls and boys of standard 8 of urban area.

$H_0_5$ There will be no significant difference between the mean scores of MCI-A of girls and boys of standard 9 of urban area.

$H_0_6$ There will be no significant difference between the mean scores of MCI-A of girls and boys of standard 10 of urban area.

$H_0_7$ There will be no significant difference between the mean scores of MCI-A of girls and boys of secondary schools.

**Hypotheses to test effect of the Area**

$H_0_8$ There will be no significant difference between the mean scores of MCI-A achieved by the students of standard 8 of urban and rural area.

$H_0_9$ There will be no significant difference between the mean scores of MCI-A achieved by the students of standard 9 of urban and rural area.
Hypotheses to test effect of the standard

\( Ho_{14} \) There will be no significant difference between the mean scores of MCI-A achieved by students of standard 8 and standard 9.

\( Ho_{15} \) There will be no significant difference between the mean scores of MCI-A achieved by students of standard 8 and standard 10.

\( Ho_{16} \) There will be no significant difference between the mean scores of MCI-A achieved by students of standard 9 and standard 10.

Hypotheses for Metacognition Inventory-B (MCI-B)

\( Ho_{17} \) There will be no significant difference between the mean scores of MCI-B of girls and boys of standard 8 of rural area.

\( Ho_{18} \) There will be no significant difference between the mean scores of MCI-B of girls and boys of standard 9 of rural area.

\( Ho_{19} \) There will be no significant difference between the mean scores of MCI-B of girls and boys of standard 10 of rural area.

\( Ho_{20} \) There will be no significant difference between the mean scores of MCI-B of girls and boys of standard 8 of urban area.
Hypotheses to test effect of the Area

Ho$_{24}$ There will be no significant difference between the mean scores of MCI-B achieved by the students of standard 8 of urban and rural area.

Ho$_{25}$ There will be no significant difference between the mean scores of MCI-B achieved by the students of standard 9 of urban and rural area.

Ho$_{26}$ There will be no significant difference between the mean scores of MCI-B achieved by the students of standard 10 of urban and rural area.

Ho$_{27}$ There will be no significant difference between the mean scores of MCI-B achieved by urban area boys and rural area boys of secondary schools.

Ho$_{28}$ There will be no significant difference between the mean scores of MCI-B achieved by urban area girls and rural area girls of secondary schools.

Ho$_{29}$ There will be no significant difference between the mean scores of MCI-B achieved by the students of secondary schools of urban and rural area.

Hypotheses to test effect of the standard

Ho$_{30}$ There will be no significant difference between the mean scores of MCI-B achieved by students of standard 8 and standard 9.

Ho$_{31}$ There will be no significant difference between the mean scores of MCI-B achieved by students of standard 8 and standard 10.
Hypotheses to test effect of Academic Achievement and IQ

Ho$_{32}$ There will be no significant difference between the mean scores of MCI-B achieved by students of standard 9 and standard 10.

Ho$_{33}$ There will be no significant difference between the mean scores of MCI-A of students of the secondary schools of Gujarat state having High Academic Achievement and Low Academic Achievement.

Ho$_{34}$ There will be no significant difference between the mean scores of MCI-A of students of the secondary schools of Gujarat state having High IQ and Low IQ.

Ho$_{35}$ There will be no significant difference between the mean scores of MCI-B of students of the secondary schools of Gujarat state having High Academic Achievement and Low Academic Achievement.

Ho$_{36}$ There will be no significant difference between the mean scores of MCI-B of students of the secondary schools of Gujarat state having High IQ and Low IQ.

1.7 LIMITATIONS OF THE STUDY

The universe is too wide to study for focusing on pin-point; one has to make the study limited.

According to Best & Kahn$^{15}$ (1989),

"Limitations are those conditions beyond the control of the researcher that may place restriction on the conclusion of the study and their applications to other situations."

Sukhia & Mehrotra$^{16}$ (1966) states that,

"A recognition of the limitations of the study helps to focus attention of valid objectives and helps minimize the danger of over generalization."

Limitations of the present study were as follows:

- The scope of the present study is limited to the Gujarati Medium secondary school students of standard 8th, 9th and 10th.
• In the present study among rural, semi urban and urban areas only rural and urban areas are included.

1.8 IMPORTANCE OF THE STUDY

Since 1979 when John Flavell coined the term "metacognition" it has become one of the more prominent constructs in cognitive and educational psychology. Since then it has triggered impressive amount of research in this field.

There are three main areas of research in which metacognition have a prominent role: developmental psychology, with emphasis on theory of mind; experimental cognitive psychology, focusing mainly on metamemory; and educational psychology with emphasis on self regulated learning.

The variety of areas and perspectives through which metacognition is being studied is due to the fact that metacognition is inextricably woven with awareness of mental states and with consciousness. In humans, it is at the roots of everyday memory and scientific thinking, as well as of social interactions that require awareness of one's and others' thinking.

Although, impressive amount of researches have been done in the field still there is a need for further research to establish its relation with other variables such as achievement scores, intelligence, emotional intelligence, motivation, stress, anxiety, age, sex, and area.

To do research in the field of metacognition, one of the most difficult problems facing researchers and practitioners is identifying metacognitively aware learners quickly and reliably.

There are many techniques to assess the metacognition and each of them has their own advantages and disadvantages. To use a self-report questionnaire or scale is the least problematic technique to assess metacognition for the country like India, because it is useful to assess students' metacognition in mass.
In India metacognition is in its infant stage, in Gujarat state only a few researchers have started doing research in this field. Furthermore, till today there is not any standardized tool available in Gujarati language to assess the metacognition. So that in this context this study to prepare a standardized tool is very significant. With the help of such standardized tool researchers can find out answers of the following questions.

- Whether metacognition is independent of academic achievement or it affects the academic achievement?
- What is the relation between intelligence and metacognition? How do they both contribute to learning and performance?
- How do metacognition develop with age? Alternatively, is it age independent?
- What is the relation between the subcomponents of metacognition? How do they affect monitoring and control processes?
- Whether metacognition is domain general or domain specific in nature?
- What is the role of metacognition in gifted children?
- What is the relation between metacognition with other variables such as aptitude, emotional intelligence, motivation, stress, anxiety, age, sex, area etc?

To find out the answers of the above mentioned questions it is important to assess the metacognition. So the present study will be helpful to teachers and researchers to do further research in the field of metacognition. Such researches will be helpful to know how students learn, what factors affect student's success and how can we improve student's scholarship.

1.9 SCHEME OF THE CHAPTERIZATION

The chapters have been sequenced to be able to move logically towards the conclusions of the study.
The remaining chapters have been divided as follows:

**Chapter : 2 : Theoretical Aspects of the Study**

There has been a theoretical framework on the subject of metacognition which needs to be introduced. This chapter attempts to bring out this theory in a crisp and clear manner, citing along its way the various references used.

**Chapter : 3 : Practical Aspects of the Previous Studies**

A researcher relies heavily on past studies and their findings. This chapter provides valuable reference to the past studies.

**Chapter : 4 : Construction of the Metacognition Inventory**

This chapter leads to the various pre-pilot, pilot and final run so as to able to construct a reliable and valid metacognition inventory. Details of instructions and scoring are also covered in this chapter.

**Chapter : 5 : Research Design**

This chapter focuses on the research planning.

**Chapter : 6 : Reliability and Validity of the Metacognition Inventory**

The concepts and types of the reliability and validity, different methods by which the reliability and validity of the Metacognition Inventory were established were discussed in detail in this chapter.

**Chapter : 7 : Analysis and Interpretation of the Data**

In this chapter the various statistical analyses, analysis of the data to test the hypothesis regarding various variables like sex, area and standard, Achievement Level and Intelligence Quotient and its findings are discussed. Establishment of the norms is also covered in this chapter.

**Chapter : 8 : Conclusions, Findings and Suggestions**

In this chapter, a brief summary of the work done, uses of the study, the various findings and recommendations are summed up. Areas of the further research are discussed in this chapter.
REFERENCES


