Chapter 6

Summary, Discussion

of results & Conclusion

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CHAPTER-VI

SUMMARY, DISCUSSION OF RESULTS AND CONCLUSION

Introduction: Education brings much covetable intellectual impact to idiosynchronisation in thinking towards the framing of new parameters that governs a powerful future. It provides a solid foundation to seed the multidimensional development of information and communication skills, thinking and problem solving skills, interpersonal and self directional skills, entrepreneurial skills, and self direction to equip the learners to build a good career and leadership in the present globalize scenario.

This chapter includes a brief summary of the study, major findings of the study, summary of implications, discussion of results, suggestions for future research.

Need of the Study: Mathematics has played a very important role in building up modern civilization by helping the study of other subjects, even though people have only a vague idea that all progress which was possible due to advancement in sciences such as physics, chemistry, medicine, engineering etc., mathematics is an important tool which is employed by all these disciplines and without these disciplines would not have made such progress. This shows that mathematics has got rich utilitarian value. Therefore the students should learn mathematics.

Mathematics can be understood only when one exercises his mental abilities i.e. analyses, reasons out, compares, that means to say that all these thinking skills are involved in the process of learning mathematics. Undoubtedly we are on the front end of discovering myriad ways to enrich and expand our thinking capacities which will unleash exponentially our ways of doing and constantly aspire for attainment of the pinnacle of knowledge and learning. In today’s accountability driven culture students need a profile of skills not only for managing this
knowledge transition but for the development of higher order thinking skills which is the need of the hour. Instead of being arbiters of knowledge, educators provide contextual strategic scaffolding for learners to engage in automatic processing, dialectical reasoning, divergent thinking and critical understanding.

Higher order thinking is imperative to progress. No explorer ever discovered anything new by following in the footsteps of those who had been there before. If lower order thinking skills seek to learn and commit to memory knowledge and know how that somebody else has already acquired then Higher Order Thinking allows for the interpretation and reconsideration of such information so that other application may be used and alternative conclusions drawn. This exposes further fields of knowledge and know, how which may again, be transferred, reapplied and collated to create a new and improved version.

Thinking is at the heart of all learning. Thinking makes things that have yet to be perceived possible, thinking facilitates and enhances one’s ability to perform and produce and pass on such vital information to others who would then do the same. Mathematics includes all of them. Primarily mathematics is a way of thinking, a way of organizing a logical proof. As a way reasoning, it gives an insight into the power of human mind, so this forms a very valuable discipline of teaching-learning programmes of school subjects everywhere in the world of curious children. So the pedagogy of Mathematics should very carefully be built in different levels of school education.

In the pedagogical study of mathematics we mainly concern with two things; the manner in which the subject matter is arranged or the method the way in which it is presented to the pupils or the mode of presentation. Mathematics is intimately
connected with everyday life and necessary to successful conduct of affairs. It is an instrument of education found to be in conformity with the needs of human mind.

Mathematics should be visualized as the vehicle to train a child to think, reason, analyze and to articulate logically. Apart from being a specific subject, it should be treated as a concomitant to any subject involving analysis and reasoning. The National Curriculum Framework for School Education (NCFSE) 2000 document echoes such sentiments as well. Yet, despite this history of exhortations, mathematics education has remained pretty much the same, focused on narrow aim. While inadequate teacher preparation and support acts negatively on all of school mathematics, at the primary stage, its main consequence is this: mathematics pedagogy rarely resonates with the findings of children’s psychology and inadequate teacher preparation reflects as inability to link formal mathematics with experiential learning. Later on, it reflects as incapacity to offer connections within mathematics or across subject areas to applications in the sciences, thus depriving students of important motivation and appreciation. To make it pretty interesting the various teaching learning materials so called interactive multimedia strategies are used to enhance the achievement in mathematics and to develop critical thinking ability among the students.

6.2 Tools used for the Study:
Table 6.2: The Tools used in the study to assess the different variables

<table>
<thead>
<tr>
<th>No.</th>
<th>Items</th>
<th>Tools used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Achievement in Mathematics</td>
<td>Developed by the researcher</td>
</tr>
<tr>
<td>2.</td>
<td>Critical thinking Ability</td>
<td>Developed by the researcher</td>
</tr>
<tr>
<td>3.</td>
<td>Intelligence</td>
<td>Raven’s SPM(1998)</td>
</tr>
</tbody>
</table>

6.4 Statement of the Problem:

In this study the researcher developed the interactive multimedia strategies based on the content of standard IX students of Karnataka State board syllabus. The investigator analyzed the effectiveness of Interactive Multimedia Strategies on Achievement in Mathematics and Critical Thinking Ability of students of standard IX. Then the study was entitled as, “The effectiveness of Interactive Multimedia Strategies on achievement in mathematics and Critical Thinking ability of standard IX students”.

6.5: OPERATIONAL DEFINITIONS

7. Interactive Multimedia Strategies(IMMS) : The Strategies which were used to teach the selected topics of Standard IX Mathematics using array of Multimedia such as Charts, Flip over Charts, Models, videos, Graphic Organizers, Power Point Presentations and other Teaching Aids.
8. **Treatment:** The researcher varied the method of teaching during experimentation in order to find out the effectiveness of Interactive Multimedia Strategies (IMMS).

   The investigator taught the experimental group with IMMS which was developed and validated by the researcher and the control group was taught by the traditional method of teaching.

9. **Interactive:** The Strategies were planned under IMMS for the interaction between the teacher and pupil in the classroom in teaching of Mathematics.

10. **Achievement:** According to Carter V. Good (1973), achievement means accomplishment or proficiency or performance in a given skill or body of knowledge, helps in declaring the examinee successful or unsuccessful, choosing the students for various professional and academic courses and selecting the candidates for different jobs”.

Achievement in Mathematics means the extent to which a student have achieved something, acquire certain information, demonstrated proficiency in certain skills usually as a result of instruction in the subject of mathematics. In the present study, it is represented by the scores of students in the achievement test in Mathematics prepared and validated by the researcher.

11. **Intelligence:** Intelligence is the person’s ability to form perceptual relations to reason by analogy independent of languages and formal schooling. In the present study, the Intelligence of the students is represented by the scores of Standard Progressive Matrices (SPM) prepared by Raven (1998).

12. **Critical Thinking Ability (CTA):** According to Scriven (1996) : “Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating
information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action”.

From the above definition CTA is defined as “the means drawing favorable judgment and encouraging a person to think deeply, to seek clarification or understand objects, involves a collection of thinking operations which help a person to determine the merit and demerits of an object”. It is represented by the scores of CTA developed and validated by the researcher.

6.6: OBJECTIVES OF THE STUDY:

The present study was designed keeping the following objectives in view:

1. To develop the Interactive Multimedia Strategies (IMMS) based on selected topics of Standard IX Mathematics Syllabus.

2. To study the effect of Interactive Multimedia Strategies (IMMS) on the Achievement in Mathematics of the students of Standard IX.

3. To study the effect of IMMS on the Critical Thinking Ability (CTA) of Students of Standard IX.

4. To find the relationship between Critical Thinking Ability (CTA) and Achievement in Mathematics (AIM) of the Students of Standard IX.

5. To find the differential effect of IMMS on the post test scores of AIM of
   a) Students of Standard IX with high and low Intelligence.
   b) Boys and girls of the Standard IX

6. To find the differential effect of IMMS on the gain scores of CTA of
   a) Students of Standard IX with high and low Intelligence.
b) Boys and girls of the Standard IX

7. To find out the Interaction effect of Gender and Intelligence on the post test means scores AIM of students of Standard IX.

8. To find out the Interaction effect of Gender and Intelligence on the Gain Scores of CTA of students of Standard IX.

9. To find out the Interaction effect of boys and girls on the post test means scores of AIM of students of Standard IX.

10. To find the effect of IMMS on AIM of experimental group after delayed post test.

11. To find the Effect of the IMMS on the gain scores of CTA of experimental group after delayed post test.

6.7: HYPOTHESES:

Based on the objectives of the study the researcher formulated the following hypotheses in the present study.

**Hypothesis -1**

There is no significant difference between of mean Post test scores of Achievement in Mathematics of experimental and control group.

**Hypothesis-2**

There is no significant difference between the mean gain scores of Critical Thinking Ability of experimental group and control group.

**Hypothesis-3**

There is no significant relationship between Critical Thinking Ability and Achievement in Mathematics of the students of Standard IX of Bangalore city.
Hypothesis-4
There is no significant difference between post test mean scores of Achievement in Mathematics of students having high and low Intelligence.

Hypothesis-5(a)
There is no significant difference between students of Standard IX having high and low intelligence in their mean post test scores of Achievement in Mathematics.

Hypothesis-5(b)
There is no significant difference between boys and girls of Standard IX in their mean post test scores of Achievement in Mathematics.

Hypothesis-6(a)
There is no significant difference between students of Standard IX having high and low intelligence in their mean post test scores of CTA.

Hypothesis-6(b)
There is no significant difference between boys and girls of Standard IX in their mean Post test scores of CTA.

Hypothesis-7
There is no significant interaction effect of gender and intelligence on the post test mean scores of AIM of students of Standard IX.

Hypothesis-8
There is no significant interaction effect of gender and intelligence on the gain scores of CTA of students of Standard IX.

Hypothesis-9
There is no significant difference between boys and girls on post test mean scores of AIM of standard IX.
Hypothesis-10
There is no significant difference between the post test mean scores and delayed post test mean scores of Achievement in Mathematics of Experimental group of Standard IX.

Hypothesis-11
There is no significant difference between the post test mean scores and delayed post test mean scores of CTA of Experimental group of Standard IX

6.7: Variables of the Study:

**Independent variable:** In the present experimental study, the effectiveness of interactive multimedia strategies is treated as independent variable.

**Dependent Variable:** In the present study the dependent variable were

  a. Achievement in mathematics
  b. Critical thinking ability

III. Moderate variable:

  a. Intelligence
  b. Gender

6.8 Statistical Techniques used for Analysis of data:

**Descriptive statistics**

The descriptive procedure displays univariate summary statistics for several variables in a single table. Descriptive statistics was employed in the present study to get mean and other statistics for the various dependent variables measured.
Pearson’s product Moment Correlation

Correlations measure how variables or rank orders are related. Pearson’s’ correlation co-efficient is a measure of linear associations. In the present study Pearson’s correlation has been done to find the correlation co-efficient between achievement and critical thinking ability test of students of experimental group.

Independent sample t-test

The independent samples t-test procedure compares means for two groups of cases. Ideally for this test, the subjects should be randomly assigned to two groups, so that any difference in response is due to the treatment or lack of treatment and not to other factors. Independent sample t-test is being applied to find the significant difference between mean scores post test of achievement in mathematics of control group and experimental group of standard IX students in the respective variables.

ANOVA: In statistics, analysis of variance is a collection of statistical models, and their associated procedures, in which the observed variance in a particular variable is portioned into components attributable to different sources of variation. In its simplest form ANOVA provides a statistical test of whether or not the means of several groups are all equal, and therefore generalizes t-test to more than two groups. ANOVA are helpful because they possess an advantage over a two sample t-test. Doing multiple sample t-test would result in an increased chance of committing a type I error. For this reason ANOVA are useful in comparing two or more means.

In this study 2X2 ANOVA is used.

6.9 Procedure of the Study: In the first stage of the study, the researcher prepared the interactive multimedia strategies for the few topics of mathematics of standard
IX syllabus. She also developed and validated the tool to assess the critical thinking ability and achievement in mathematics. In the second stage the researcher administered critical thinking ability test and Raven's SPM to both control and experimental group. Then she taught the students of experimental group using interactive multimedia strategies and the students of control group by conventional method. Later she administered achievement in mathematics and critical thinking ability test to both experiment and control group. After a gap of 20 days the researcher administered achievement in mathematics and critical thinking ability test to experimental group. During the third stage the investigator analyzed and interpreted the data.

6.10 Findings of the Study:

The following are the findings of the study

1. The Interactive multimedia strategies implemented resulted in enhancing the achievement in Mathematics of students of Experimental Group.
2. The interactive Multimedia strategies used resulted in enhancing the critical thinking abilities of the students of the Experimental Group.
3. Gender of the Students has no influence on the achievement in Mathematics (AIM) of students of Experimental Group.
4. The difference in the levels of the intelligence of the students has influenced the achievement in Mathematics among the students, the high level intelligence greater would be the Achievement in Mathematics and low the level of intelligence would be the lower achievement in Mathematics.
5. The difference in the levels of the intelligence has influenced the Critical thinking ability of the Students.
6. There is positive correlation between the achievement in mathematics and critical Thinking Ability among the students
7. There is no interaction effect of gender and CTA on achievement in mathematics of Standard IX students.
8. There is no significant interaction effects of gender and intelligence on the posttest mean scores of AIM of students of Standard IX.
9. There is no interaction effect of gender and intelligence on the gain scores of CTA of students of Standard IX.

6.11: Discussion of Results

In the present study the IMMS were found to be effective in enhancing AIM. The studies conducted by Morero(1991), Srikanta Swamy(1995),Valerie Frear and John J Hirschbuhl(1999), Panda, Subhas Chandra and Chaudhary, Jayakrushna (2000), Timothy (2001), Singaravelu (2002), Khadiravan and Suresh (2002), Vasanthi and Hema (2003), D.Idayavani, S. Shanthi (2003), Minliu (2003), Faculty of educational studies. University of putia Malaysia (2003), Nirmala Sundaraj and Annaraja (2005), Antony Gracious (2005), R. Gnanavedan, V. Nimavathi (2008) MaiNeo and Tse-Kian Neo(2009), Syaza Hazwani Zaini, Sita Zalina Mokhtar & Mokhtar Nawawi (2010), Hamizer B Mohb Sukor, Dr. Baharuddin B Aris, Mohammad B Bilal Ali (2010), Dr. E.Ramganesh (2011), Sawsan Nusir, Izzat Alsmadi Mohammed Al-Kabi fathima Sharadgah (2012) showed that IMMS were effective in helping the students in developing critical thinking abilities and also do well in achievement. Multimedia Strategies have shown positive effect in enhancing the performance of the students in the different subjects. But the multimedia strategies do not affect the achievement is contradicted by the study conducted by Rile (1991) in which the questioning technique using multimedia did
not make a significant impact on students achievement scores. The study conducted by Klemont and Teixeria (2002) also falls in the line of contradiction, the findings of their study reveal that there was no statistically significant difference between the treatment in overall achievement of the learner. The study conducted by Thilaka Suresh and Pramila (2000) also supports the contradiction through their study and the findings reveal that there was no influence of computer based media program on the achievement in mathematics among the high school students. But however there is a change in their attitude after learning through computer based multimedia program. This may be due to self learning material which is used in the workshop course was not self sufficient and might not contributed to enhancement of achievement in their respective subjects.

The present study showed that the IMMS were found to be effective in enhancing CTA. The studies conducted by Morero (1991), Srikanta Swamy (1995), Valerie Frear and John J Hirschbuhl (1999), Panda, Subhas Chandra and Chaudhary, Jayakrushna (2000), Timothy (2001), Singaravelu (2002), Khadiravan and Suresh (2002), Vasanthi and Hema (2003), D.Idayavani, S. Shanthi (2003), Minliu (2003), Faculty of educational studies. University of putia Malaysia (2003), Nirmala Sundaraj and Annaraja (2005), Antony Gracious (2005), R. Gnanavedan, V. Nimavathi (2008) MaiNeo and Tse-Kian Neo (2009), Syaza Hazwani Zaini, Sita Zalina Mokhtar & Mokhtar Nawawi (2010), Hamizer B Mohb Sukor, Dr. Baharuddin B Aris, Mohammad B Bilal Ali (2010), Dr. E.Ramganesh (2011), Sawsan Nusir, Izzat Alsmadi Mohammed Al-Kabi fathima Sharadgah (2012) show that IMMS were effective in helping the students in developing critical thinking abilities and also do well in achievement. This study showed that MCAI was superior to traditional classroom teaching in the transmission of health-related fitness and nutrition knowledge. Kolb (1984) suggested that the use of (MCAI)
might enhance students’ performance through facilitation of active and experiential learning. The present model of (MCAI) may have promoted active learning because it encouraged students to take an active role in the learning process and have better control over their education but as the Chu and Chen (2000) study showed, the positive effects of MCAI are more evident in learning academic-related content. There has been concurrent research into learning approaches and Jones and Tanner(2002) offer evidence to show that interactivity is most effectively sustained through effective questioning as well as a wider range of activity. As a result later literature is moving towards consideration of the technology and pedagogy of interactivity. Simpson etal. (1998), Cogill (2003), Robison (2000) and Damcott et al (2000) demonstrate the use of Interactive technology within mathematics as a subject area with diverse ability groups. They stress the need for changed approaches to teaching to optimize the teaching and learning value of the technology. Even though interactive whiteboard use might not increase students’ academic achievement significantly, it was seen that it encouraged student participation in the lesson, created a more exciting and enthusiastic atmosphere, and led to more enjoyable lessons. These findings overlap with the benefits mentioned by other studies (Becta, 2003; Wall et al, 2005; Cuthell, 2003; Smith et al, 2005; Cannalbur and Özdener, 2008). In addition, many students in the experimental group stated that interactive simulations and virtual experiments involved situations that they did not normally encounter in real experiments and this enabled them to visualize the topic. Similar findings have been reached by other researchers, (Perkins et al., 2004; Wieman and Perkins 2006; Perkins et al., 2006; McKagan, Handley, Perkins and Wieman, 2009). From a general perspective, the results of the study are similar to those encountered in the literature. It was also found during the study that lessons conducted with interactive whiteboards were more fun, had more on-task time and greater
participation. The most significant evidence for the academic improvement resulting from interactive whiteboard use was a comprehensive study conducted by Becta (2003). In this study, the term ‘improvement’ was used instead of reference to ‘increasing academic achievement’.

But the multimedia strategies does not affect the achievement is contradicted by the study conducted by Rile (1991) in which the questioning technique using multimedia did not make a significant impact on students achievement scores. The study conducted by Morero (1991) also contradicts that the teachers who were taught using thinking frames using multimedia did not obtain statistically different scores than control group. But however in the quantative analysis of the data reached a higher level of critical reflection. Thinking frames seems to be the process for helping teachers become critically reflective. The study conducted by Klemont and Teixeria (2002) also in the line of contradiction, the findings of their study reveals that there was no statistically significant difference between the treatment in critical thinking achievement or overall achievement of the learner. This may be due to self learning material which is used in the workshop course was not self sufficient and might not contributed to the development of Critica Thinking Ability and enhancement of achievement in their respective subjects.

**Chu and Chen (2000)** developed a multimedia prototype on serve of badminton and conducted an experimental research in elementary school classes (sixth grade) to explore whether the multimedia material is a helpful tool to motor skills learning. The multimedia computer-assisted instruction group had better results on the cognitive test but not on the motor skill test than the traditional instruction group.

In the present study there is no significant difference between achievement in mathematics of boys and girls. The Studies conducted by Chaudhary GG (1983),
Patel JZ (1987), Piyavadee Boonsathron (1988), Srikantha Swamy (1995), Dayavathi (2000), Klement and Teixeira (2002) reveals that there is no significant difference between the post tests mean scores of boys and girls with respect to their achievement in their respective subjects and also in their critical thinking ability that means both the boys and girls are equally well performed in their achievement and development of critical thinking abilities it may be because of the usage of the interactive multimedia strategies..

This is contradicted by the study conducted by Myrtle Maria A.C (2001) which reveals that there was significant difference between the mean scores of boys and girls on the total scores.

The study conducted by Fayza, S. Al-Hammadi (2009) also falls in the line of contradiction that the girls had scored better than boys.

The study conducted by Panda, Subhas Chandra and Chaudhary, Jayakrushna (2000) also supports that male students are superior to girls in learning physics. The study conducted by Sumangala (2000) also in line that the scores of female B.Ed students in critical thinking skills were higher than male B.Ed students of Mangalore University.

This might be attributed to provision of same facilities and exposures to both boys and girls in urban area.

In the present study, the difference in the levels of the intelligence of the students has influenced the achievement in Mathematics among the students. The studies conducted by Patel JZ (1987) showed that the Students having high Intelligence have high creative thinking ability and lower intelligence have low creative thinking ability. But the study conducted by Chaudhary (1983) falls in the line of
contradiction showed that the students with high intelligence did not have more creative thinking ability than the students of low intelligence.

5. In the present study, the difference in the levels of the intelligence has influenced the Critical thinking ability of the Students. The studies conducted by Patel JZ (1987) shows that the Students having high Intelligence have high creative thinking ability and lower intelligence have low creative thinking ability. But the study conducted by Chaudhary (1983) falls in the line of contradiction showed that the students with high intelligence did not have more creative thinking ability than the students of low intelligence.

6. In the present study there is positive correlation between the achievement in mathematics and Critical Thinking Ability among the students. The studies conducted by Rajaswaminathan (1998), Patel J.Z (1987), Sumangala (2000), Harish G.C (2011) have shown a positive relationship between CTA and achievement in their respective subjects. This shows that usage of interactive multimedia strategies in the teaching learning process would enhanced the achievement in their respective subjects.

7. In the present Study, there is no interaction effect of gender and CTA on achievement in mathematics of Standard IX students. The study conducted by Srikanta Swamy (1995) shows that there was no significant interaction between the nature of the test, sex, SES and intelligence regarding all the components of critical thinking skills and also there was no significant interaction between sex, 3SES and critical thinking skills with respect to achievement in methods of teaching of physics.
6.12 EDUCATIONAL IMPLICATIONS:

According to the present study, IMMS were effective in enhancing the AIM of students. This shows that the teachers of mathematics should use multimedia in their teaching and use them for interaction with students. So that the students would do better in achievement test. The Department of public instruction should organize workshops to train the teachers to use multimedia in their teaching.

In the present study, the IMMS enhanced the CTA of students and a positive correlation was found between AIM & CTA. Therefore the multimedia should become integral part of the curriculum and this would enable the students to become better critical thinkers. Hence, the opportunities for developing critical thinking ability of students should be provided in the classroom which would boost the components of CTA like analyzing, problem solving, interpreting which helps them to solve day to day problems.

The present study revealed that there is no significant difference between boys and girls with respect to AIM. Hence, both boys and girls should be provided equal opportunities while studying mathematics. Hence there should be no gender discrimination done in teaching mathematics.

The study presents the effect of Interactive Multimedia Strategies in secondary schools. The study highlights positive effects of interactive multimedia strategies over the conventional approach in fostering higher order thinking and Achievement in Mathematics among secondary school students. Thus, the present research has implications on framing the curriculum to improve quality of learning in general and Mathematics learning in specific. The study may initiate discussions in education sector for evolving new initiatives in pedagogical approach to enhance meta-cognition among learners and to empower students to become ‘Global
Having established that higher order thinking can be developed, serious efforts congruent with the present study may be undertaken to enhance critical thinking and problem solving among students through mathematics.

The positive reaction of students towards Interactive Multimedia Strategies suggests a way of making learning a joyful process and the same time enhancing its quality. Since this strategy is more activity oriented, it is suggested that for effective implementation, the class strength should be limited in the range of 25-35; the study stresses the need to change the classroom environment for promoting higher order thinking and learning mathematics by incorporating a collaborative learning atmosphere through the planned effort. This suggests that students need to be taught the thinking skills necessary for interacting with people especially in day to day life. Helping students learn to ask the right kind of questions and to build on each other’s thinking may be a key component in orchestrating collaboration.

Since the study revealed that students find time allotted for Interactive Multimedia Strategies in schools in not sufficient, this has an implication on school administrations to provide enough flexibility with respect to time and other resources so that the strategy can be effectively implemented. The study attempts to provide inputs to educationist in designing Interactive Multimedia Strategies for mathematics learning. This could be used by educationists while designing similar educational programmes.

The study examined ways and means of improving mathematics education by Interactive Multimedia Strategies made available by an NGO namely, ‘Oracle Educational Initiative’ working in schools. This indicates that initiatives by Non-Government Agencies and Public Private Partnership (PPP) can be entertained to improve quality of learning in schools.
MOU should be done between the Government of Karnataka and the companies like Infosys, Wipro to conduct programmes to teachers and students on the use of the computer graphics etc., in school subjects in general and mathematics in particular.

At the outset of the study, the investigator enquired about the prevalent stance of mathematics education at secondary school level by conducting a face-to-face interaction with select experts and practitioners in this field. The conclusions derived in this respect evinced that a realignment of mathematics learning scenario is inevitable now in order to bridge the gap between what the learners acquire from the mathematics classroom environment and what knowledge and skills they are expected to have to meet the demands of 21st century communities. Educational institutions are struggling to keep pace with the astonishing rate of change in the learners’ life outside the school due to the inception of innovative trends in social media technology. They have to spend their lives in a multitasking, multifaceted, technology driven, diverse, and vibrant and globalize world and they must arrive at equipped to do so. This situation demands the symbiosis of multipronged pedagogical modes to fabricate a culture of higher order thinking in every mathematical task engagements. In the prevalent scenario of mathematics learning, the learners experience certain barriers and hindrances in the effective processing of information and knowledge production. They are often constrained by mental habits, biases, presuppositions and preset standards of operations that tend to close off new ways of perceiving and interpreting their experiences. The results of public examinations of standard X and higher secondary in mathematics reveal that a large proportion of pupils are still struggling to deal with the subject fruitfully even though some potential improvements in the pedagogy of mathematics like activity oriented approach were introduced into the curriculum. A major reason behind this
observable fact can be the dearth of innovative and Interactive Multimedia Strategies which enforces the learners to think deliberatively, and articulate the rationale that underlines their learning decisions. Interactive Multimedia Strategies can make perpetual problem solvers who can synthesize experiences integrating information and feedback, uncover underlying reasons and discover new meaning. All the practitioners in mathematics education need to be made aware of and be disposed to constructive pedagogical instruments involving reflective journaling, portfolio writing, PBL, graphic organizers, inquiry approaches and the like to upgrade the landscape of mathematics learning. The curriculum framers, policy makers and teacher educators should allocate plethora of educational resources’ to bring about the needed critical changes in both in-service and pre-service course of teacher education.

Mathematics education should broadly embrace the view that learning is not solo and internal activity; rather learning efforts are distributed over the individual learner’s mindful and effortful involvement. Engaging one with mathematics tasks requires frequent opportunities to make sense of it and to recognize the benefits of perseverance. Success in mathematics learning requires being positively disposed toward the subject. If students are to learn, act, and apply mathematics expertise effectively, they should see it as a subject in whom things fit together logically and sensibly and they need to believe that they are capable of figuring it out. Students who are proficient in mathematics become more confident of their expertise to learn the subject. They need to believe that they can develop understanding of the mathematical concepts, strategize solution procedures, reason out propositions and be positively disposed towards the subject. To be cautious in arranging every pedagogical endeavors that should address the integrated stands of
proficiency to make knowledge stronger more durable more adaptable more useful and more relevant.

The findings of the study set the stage for more ambitious exploration of the role of Interactive Multimedia Strategies for activating habits of mind in the entire realm of school education as well as higher education. The enculturation process into this new design of instruction requires both cognitive and psychological realignment of the contextual constructs of the set task. Learners have to call upon to become more open minder and receptive of cognitive networks and patterns of the exercise tasks. In order to adapt to this new design implementation facilitators should assume a multifaceted guiding role and create an interactive classroom learning culture though discussion and discourses. When learners combine the use of visual tools with the habits of mind to crystallize their thinking, they could see their won accommodating ideas and thus gain new sense of themselves as efficacious thinkers and problem solvers. Educators and instructional facilitators need to ensure that learners consciously apply thinking maps into their daily learning by redesigning the materials they already use in their classrooms, educational administrators, policy analysts, scenario planners and knowledge managers should promote appropriate training programme for all the stake holders of this innovative pedagogical tool is another indispensable condition for the implementation of Interactive Multimedia Strategies The finding of the study suggest that educators should concern themselves more with the development of a Interactive Multimedia Strategies and Implementation of Interactive Multimedia Strategies that teaching students to improve the achievement of students in their respective subjects. Hence it is high time to orient the educational practitioners at all levels of habituate Interactive Multimedia Strategies in their daily classroom transactions for building
productive learning population as well as for their professional development by the educational planners and administrators.

These Interactive Multimedia Strategies are intended to help students to perform better in their academic achievement and also enhancing the thinking skills among the students and can determine for themselves how to improve. It is a systematic way to chart growth and improvement of the behavior anchors of the learning output and empower them to analyze where they need to focus to improve. Hence, the study implies a systematic orientation, development and practices of distinct Interactive Multimedia Strategies in the educational sector by all the practitioners at all the levels.

6.13: SUGGESTIONS FOR FUTURE RESEARCH

1. The effectiveness of Interactive Multimedia Strategies may be tried on Primary school students.
2. IMMS Should be developed in the content of English, chemistry, literature, physics and etc.
3. The effectiveness of Interactive Multimedia Strategies can be tried out on other variables like self-direction, self-esteem, judgment and etc.
4. The same study can be conducted at Pre university level.