CHAPTER III

REVIEW OF RELATED LITERATURE

3.1 STUDIES ON COMMUNICATIVE COMPETENCE
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REVIEW OF RELATED LITERATURE

The review of related literature involves the systematic identification, location and analysis of documents containing information related to the research problem. The knowledge that emerges through the reviewing of literature provides the understanding and insight necessary for the development of a logical framework into which the problem fits besides facilitating interpretation of the results.

Best and Kahn (2007) believe: “A summary of the writing of recognised authorities and of previous research provides evidence that the researcher is familiar with what is already known and what is still unknown and untested.”

A survey of related literature is necessary for proper planning, execution, and developing right concepts of the problem and solutions. It provides guiding hypothesis, suggestive methods of investigation and comparative data for interpretative purposes.

In the present chapter, the literature review and studies in close proximity to the present study have been discussed. An attempt has been made here to review the researches that have been done in India and abroad. The points emerging from the review of the related literature have also been objectively discussed.

The studies and literature have been reviewed and classified under the following sections:

3.1 Studies on Communicative Competence
3.2 Studies on Reflective Teaching

3.3 Studies on Concept-Mapping

3.4 Studies on Problem-Solving

3.5 Studies on Portfolio learning

3.6 Studies on Teacher Empowerment

### 3.1 STUDIES ON COMMUNICATIVE COMPETENCE

The need to develop communicative competence has been widely accepted. But often the modes adopted to materialise the goal are far from satisfactory. What is required is a systematic study in this area and a search for modes that facilitate the development of communicative skills. An attempt has been made in this direction in this section.

The researcher came across a few doctoral theses by a few scholars, who had used communicative approach in English Language teaching which are presented below in a chronological order.

Lalita (1979), in her study investigated the different approaches, methods and classroom techniques used in composition classes in degree classes in South India. The effort was to find a practical answer to the question of what might be an efficient approach to the teaching of composition, so that writing becomes a meaningful, relevant and interesting process to the student. The specific functions of writing as against of those of speaking, and functional writing as against those of creative writing are examined in the context of second language learning. It was found that both
the select approaches, namely, linguistic based and semantic based approaches produced an improvement in communication and the students were found to achieve functional writing accurately.

Mohanraj (1980), in his study briefly reviewed the English language teaching situation that exists in India today and the need to continue the teaching of writing at the tertiary level. In connection with the research, a fieldwork was conducted which revealed several of the drawbacks in the system of language teaching practised at the University. In order to overcome most of the drawbacks, teacher-training or teacher preparation was envisaged as a possible solution.

Katherine (1981) reviewed literature on differences in characteristics of language development. She found evidence for two styles of acquisition and their continuity over time is examined. Explanations in terms of hemispheric functions, cognitive maturation, cognitive style, and environmental contexts are considered, and an explanation in terms of the interaction of individual and environment in different function context is suggested.

Saraswathi (1982) in her thesis confined her study to the needs of B.A/B.Com./B.Sc students of Madras University. She had not only presented an approach course design in EOP for learners at the tertiary level in Tamil Nadu, but also developed EOP materials different from the existing ones. She concludes that the design and approach would yield good results since classroom experiences suggest that learners enjoy being treated as thinkers and problem solvers.
Savignon (1983) is one of the pioneers in the field of communication strategies training. She seems to have realised that the mastery of the mechanics of a language did not ensure the ability to use the language for communication. In her study with three groups of college students, she found that although there was no significant difference among groups on tests of grammatical competence, the students who had received training in communicative skills felt better prepared to use their limited knowledge of French to advantage. Freed from an overt concern with linguistic accuracy, they were able to communicate in French whereas the control group were not.

Soumini (1984) designed a course based on the communicative approach to English language teaching in regional medium high schools. The parallel group experimental design was employed for the study and the educational implications of the study are: English language teaching through the communicative approach will give students some capacity both for receptive and productive knowledge, and that the activity-oriented language learning has to be reshaped by designing suitable tasks so as to facilitate the development of communicative skills.

Gotelibeb (1985), Health (1987), and Gupta (1988) worked in the area of communicative competence at different levels. The survey of these studies helped the investigator to select the idea of developing communicative competence in written English in the present study.

Jallaludhin (1985) in his doctoral thesis examined different types of approaches in comparison with communicative approach. He concluded that
communicative approach in English language teaching was more effective than the existing methods of approach to language teaching.

Gupta (1988) conducted an experimental study to find out the efficacy of language laboratory exposure in developing language proficiency and communicative competence of tribal learners of English. The study was limited to listening and speaking skills of VIII, IX and X classes’ tribal learners. The experimental pre test, post test equal design was used for the study. A standardised test for listening comprehension and another test developed by the researcher were used. It was found that language laboratory exposure developed language proficiency of the tribal learners of English.

Buch (1989) conducted a study to develop the ability of learners who were inhibited from using communication strategies (CSs). In her study, she prepared a set of activities on the assumption that in performing those activities learners would resort to various CSs. However, in order to find out whether the proposed activities are teachable in the classroom situation and whether they contribute to the development of use of CS, a 14-day pilot teaching programme was carried out at Gujarat Land Society Institute of English (GLSIE), Ahmedabad. The researcher came to the conclusion that the outcome of the pilot programme was successful. That means, the use of CSs enabled the learners to express themselves better. Moreover, it increased the learner’s participation in the classroom activities enhanced target language interaction. A positive change with regard to the learners’ language behaviour was also noticed towards the end of the programme.
This means strategy training helps the learners to participate in Target Language communicative situation effectively.

Sumalini (1993) studied a communicational approach for the teaching of vocabulary at the intermediate level. Her study attempted to focus on semantics, which is a neglected area at the teaching-learning scheme. She proposed a strategy for effective vocabulary teaching in such a way that it is not the target words in isolation that are focused on, but target words as they appear within the environment that are syntactically and semantically suitable to receive them are focused upon and picked up as minimal units in communication. She concluded that given an improved awareness about effective learning of vocabulary, the English as Second Language teachers will be able to do better justice to their vocabulary teaching.

In a study that aimed at developing writing skills in the Second Language (L2) using the First Language (L1) abilities in a bilingual set up, Rao (1996) aimed at empowering secondary level learners from the mother-tongue medium background to write effectively in English using appropriate cohesive devices. The results of the study show that learners are able to perform relatively better in their writing skills in English following sustained training sessions, and support the assumption that better performance in L2 can be predicted following a period of training in writing in the L2.

Sasikala (1999) studied the Oral English Acquisition Effect of communicative tasks and cognitive strategies. She attempted to assess the effect of communicative tasks and cognitive strategies on the oral English
acquisition among class XI students. The major findings of the study were that: communicative tasks facilitated oral English acquisition; and that group work and pair work tasks enabled students to acquire more English. It was also found that role plays and imagery were the most used strategy.

Chaturvedi (1999) explored group dynamics through communicative tasks in a secondary classroom based on her experiences in teaching English at the secondary level. One of the techniques that she used was dividing the class into groups and involving the learners in the task-based activities. She studied the relationship between the group dynamics and tasks. The procedure adopted for conducting the study and analysis of the data was ethnographic. The study revealed that tasks influenced the quantity and quality of interaction more than grouping. The quantum of interaction improved with open-ended authentic tasks. The group characteristics and grouping influenced turn-taking and negotiation of meaning and hence the interaction to some extent. The findings of the study have implications for material production, teacher training, learner training and ELT research.

Kumar (2000) evaluated the implementation of the West Bengal functional communicative syllabus with particular reference to rural schools. The findings of the study present an astounding picture of the implementation of the system. The Board’s sincere endeavour in designing the syllabus and formulating the materials has not been questioned. Most teachers involved in this study are overtly interested in carrying out the Board’s objectives. Yet their practice in the classroom does not confirm to the basic requirements of
the Functional-Communicative approach. Consequently, students who are instrumentally motivated to learn the language are becoming helpless victims. The main finding of this study is that the implementation of curriculum change has not been effective despite a good syllabus worked out with good intentions based on a rational, need-based approach.

Mohammad (2000) undertook a research study about Yemeni learners’ oral communicative competence in English at the tertiary level. This study attempted to identify the nature of problems faced by Yemeni students in communicating with competent native speakers of English, especially those speakers who do not share the first language with the learners. His study focused on the nature of problems and reasons for failure of the Yemeni students in oral communication. In order to investigate the problems faced by students, a detailed questionnaire was administered to students and teachers. The questionnaire was supplemented by interviews. The study followed the pilot run-main study format. It emerged from the study that the students’ lack of communication strategies is the major factor that adversely affected the students’ ability to communicate. Yemeni students were not aware of the strategies that could enable them to keep the channel of communication open with their interlocutions.

Qi and Lapkin (2001) too had noted in their study that having learners compare their texts to native speaker’s reformulations seems to allow learners to be autonomous in their ability to find their own output errors.
Ferris (2002) in one of his works suggests the use of authentic texts in classrooms which contain familiar content so that learners’ attentional resources would be allocated to the content of the text rather than to the use of grammatical form in the text.

Cai (2003) and Waters (2004) in their studies reiterate the need to incorporate English Language Teaching activities which encourage active mental processing so as to enhance the students’ knowledge of the language system and their ability to use it in communication.

The results of a study conducted by Caroline and Estela (2006) revealed that engaging learners in a explicit task in which they compared their own use of grammatical form in their own written output to the use of grammatical form as used in a text written by a native speaker could allow learners to make gains in grammatical accuracy.

Arthur et al. (2007) has found that ‘genre approach’ with a sequenced and structured teaching methodology, within a motivating theme of activities can be an effective way to teach writing to students.

The study by Henry and Marie (2008) attempted to find gender variances with regard to learning a foreign language. In the study, Swedish boys’ and girls’ attitudes prior and subsequent to the introduction of a new Foreign Language in the curriculum were compared. The results reveal that girls and boys approach their studies of a new of foreign language with different attitudes, girls having more positive self-concepts as foreign
language speakers and a greater interest in the communicative potential of foreign languages.

The result of one of the research studies by Juan and Ma Elina (2009) illustrates that children’s linguistic development is below what is considered to be normal for their chronological age. On their experiment with 74 children between 6 and 18 years of age, it was found that children have greater difficulty in pragmatics and morphology than in syntactics and semantics.

The studies point towards the need to develop language frameworks that lead learners to conduct their own learning, discover their own answers, create their own interpretations through a divergent mode of conceptualisation so as to effectively communicate. It is being increasingly felt that learners require a reflective frame of mind to make suitable associations and to build meaning and also that teachers have a pivotal role in fostering the type of higher order thinking that facilitate thoughtful action and improved performance.

The next few sections of the review are therefore set apart to understand the impact of reflective practices and the need to empower teachers in the use of such practices.

### 3.2 STUDIES ON REFLECTIVE PRACTICE

There is considerable literature on the application of reflective practice in education. Reflective practice is a meaningful and effective professional development strategy, a way of thinking that fosters personal learning,
behavioural change, and improved performance. Through systematic inquiry and analysis, it is a way for individuals to create meaningful and enduring change by changing themselves. As a basic learning strategy, reflective practice is relevant for any type of organization and in any walk of life. The investigator, for the purpose of the study, has traced many literature and research reports in this area. An effort has been made to document only those studies or reviews in close proximity with the present study.

Since the inception of reflective teaching, various researchers have attempted to gain a better understanding of the process and how it can best contribute to teacher preparation.

In their research studies, Holton & Nott (1980); Troyer (1988); Williams & Hough (1980) found that individuals who engaged in reflective teaching could develop their analytical skills greatly and improve their classroom decision making, broaden their teaching repertoire and positively impact their learners.

Cruickshank and Applegate (1981) observed in one of their journal articles that reflective practices in language classroom helps teacher trainees to think about what happened, why it happened, and what else could have been done to reach their goals.

Several studies point out the crucial role that reflection plays in professional development. Whan (1983) and Cocozzelli (1987) opined that reflection enables professionals to integrate theories and practice; Carr et al. (1989); Usher & Bryant (1987) in their studies admit that student learning is
enhanced when teachers engage in reflective practice. Marton & Saljo (1976); Yelloby & Henkel (1995); and Taylor & White (2001) reiterate that reflection enhances the moral and ethical development in learning and facilitates the development of vocationalism. Reflection is believed to nurture students’ constructive action (Pope & Denicolo, 1989).

With regard to metacognition and children, Nisbet and Shucksmith (1986) cited key research in the field and argued that children already begin to develop metacognitive knowledge or awareness which could control their strategic activities while they are still in primary school. They pointed out, however, that younger children are initially unable to utilise that knowledge spontaneously. Nevertheless, they have the ability to monitor and evaluate their own thinking and act strategically.

Schön (1987) has called for the inclusion of reflective practices in education when he says: “the professional schools must rethink both the epistemology of practice and the pedagogical assumptions on which the curricula are based and must bend their institutions to accommodate the reflective practices as a key element of professional education.”

Simmons and Schuette (1988) in one of their journal articles, consider a reflective teacher as one who makes instructional decisions consciously and tentatively, and critically considers a full range of pertinent contextual and pedagogical factors. He/she actively seeks evidence about the results and continues to modify these decisions as the situations warrants.
Some motivational theorists (Connell & Wellborn, 1991; De Charms, 1976; 1984; Deci, 1980; Deci & Ryan, 1985) are of the view that reflective practices serve a basic psychological need by making practitioners experience themselves as capable of producing desired outcomes and avoiding negative outcomes.

Barrett (1990) has included a model of five elements in the cycle for the process of reflective thinking which in hand leads to professional growth of both pre-service and in-service practitioners. Barrett is of the opinion that this model enables the teachers to ask five pertinent questions to themselves, namely, ‘What do I do as a teacher?’ ‘What did I intend?’ ‘How did I come this way?’ ‘How might I teach differently?’ and ‘What and how shall I teach now?’ (cited in Pickett, 1996).

Richert (1990); Beyer (1984); Florez (2001) and several others have noted that reflective inquiry brings flexibility in instructional settings by helping practitioners examine successes and failures in a constructive environment and promotes self-awareness and knowledge through personal experience.

Dewey (1933) having observed the classroom practices of reflective practitioners reiterates emphatically that critical reflection has more impact on the quality of schools and instructions than the teaching techniques one uses (cited in Cook, 1993).

Zeichner and Liston (1996) have emphasised that when educational programmes include reflective inquiry as part of their curriculum, these programmes seek to train student teachers who are willing and able to reflect
on the origins and consequences of their actions. The student teachers would be helped to develop pedagogical habits and skills necessary for self-directed growth and towards preparing them individually and collectively, to participate as full partners in their making of educational practices (cited in Richards, 2000).


Jaworski (1994) identifies a sequence of activity of the reflective process for the teacher in one of his publications. They are:

i) Recognising, noticing, and reflecting on significant events that have occurred in the practice of the different members of that community;

ii) Engaging in critical analysis about the theoretical perspective and possibly to enlarge the theoretical referents.

iii) Validating the results from the different roles considered in the community inquiry.

According to Brice & Roseberry (1999) if teachers employ good questioning techniques by asking a question, and allow ample wait time, student progress in the use of language would increase considerably. They emphasise the need to relate information as much as possible to students’ prior knowledge and scaffold instruction whenever required.

Beckett and Haley (2000) are of the opinion that providing students with advance organizers and making connections could develop competency
in the use of English. They favour the inclusion of group work and a language-rich classroom.

Goleman (1998, 2000), Stein & Book (2000) in their publications point out that a reflective culture develops social awareness and empathy and builds strong interpersonal relationships, which are the key components of emotional intelligence. According to Berkey et al. (1990) and Sagor (1991), the above values are inculcated due to the opportunities of ‘attending’, ‘reflecting’ and ‘questioning’, that reflective practices provide.

Leitch and Day (2000) opined that reflective practitioners should possess a set of attitudes towards teaching practice based upon broader understandings of self, internal conversation of the practitioners where he/she takes hold of the process/or experience that has occurred, reframe it, and tries to experience it from a different perspective and improve or adjust previous experiences.

Meyer (2000) in one of his articles focuses on effective ways teachers can help learners of English as a second language to overcome barriers to meaningful instruction. According to him, teachers can use strategies based on social interactionist theory, such as that of Vygotsky, to create classroom conditions that foster learning by modelling, scaffolding and helping students construct understanding, with the eventual goal of becoming independent thinkers and problem solvers.

Yost, Sentner, and Forlenza-Bailey (2000) in one of their journal articles emphasise that in order to induct preservice teachers to reflective
modes, it is essential to consciously guide their reflection through a structured pattern of thinking initially. According to them, such initial levels of reflection are ‘essential aspects of initial student teacher development and a precursor to other kinds of reflection’.

Cochran-Smith and Lytle (2001) argue that in order to develop reflective skills among prospective teachers, it is essential that they take up ‘an inquiry stance on practice’ and work together in inquiry communities. That is, prospective teachers should engage in self and peer evaluation. This, according to the practitioners, could build new forms of reciprocity between teachers and academics and other education stakeholders and the groups involved would be actively involved in dialogues and collaborative work and ultimately improve their communicative skills.

Evan et al. (2001) in one of their articles reiterate that schools/colleges must re-examine their instructional methods, materials and strategies to ensure the incorporation of critical thinking and problem solving into their curricula and they believe that engaging in reflective practice could pave way for the same.

Montalbano (2001) conducted an action research study that engaged teachers in reflective practice. Her study focused on teachers working with at-risk elementary students during a summer programme. It was found that as teachers engaged in reflective practice, their understanding of themselves and their students enhanced with a subsequent change in their students’ efficacy in the classroom.
According to Joyce ad Showers (2002), peer coaching can serve as an effective reflective tool that involves many types of interactions, ranging from co-teaching, to unit planning and the expansion and refinement of new skills, ideas and classroom research modes. Robbins (2004) too terms peer coaching as a powerful design for professional learning in one of their publications.

In one of his research articles published in a journal ‘Leadership and Policy in Schools’, Cambron-McCabe (2003) discusses the need for a facilitator to serve as an organisational buffer and change agent who is capable of generating a sense of security, mutual trust and communication in a reflective environment.

Vandergrift (2003) demonstrated that reflection on the processes of language skills was beneficial for young learners. The reflective exercises included were ‘prediction’ and ‘evaluation’. The results based on introspect data suggested that the activities sensitised the learners to the listening processes and developed their metacognitive knowledge.

Cooner and Tochterman (2004) experimented with ‘guided storytelling’ as a mode for initiating reflection for action. They found that guided storytelling was an effective way to understand varied perspectives, to prompt inquiry, and to foster new insights and learning.

Reflective practice, if not properly catered to, could lower the quality of education was quoted in the studies conducted by Osterman and Kottkamp (2004). They found that traditional organizations that are managed unilaterally
are often marked by defensiveness, passivity and resistance. Consequently, skills of inquiry and advocacy, while essential to reflective practice, are not well developed.

Various studies reveal that reflective practice promotes a professional community focused on increasing student learning (DuFour, 2005; Fullan, 2000; King & Newman, 2000; Newmann & Wehlage, 1995).

Bright (1996) (as cited in Jennifer et al., 2006) highlights that reflective practice serves as the foundation for continuous learning and more effective action in educational practice so that children are successful in school and in life.

Kinchole (2004) (cited in Jennifer et al., 2006) reiterates that collaborative reflective practices could engage a greater variety of perspectives for addressing the many challenging and complex dilemmas of practice. He observes that when reflection becomes embedded in the practice repertoire of educators, isolation is reduced and relationships are strengthened.

Christine and Taib (2006) in one of their journal articles outline a small-scale study of metacognitive instruction for second language learners. Their studies revealed the fact that process-based approach like reflective approach was found beneficial for weaker learners too in improving their listening skills and in building confidence in completing the set task. The learners were found to gain better strategic knowledge for coping with comprehension difficulties.
Caroline and Estela (2006) conducted a study on English as a Second Language (ESL) learners’ ability to make improvement in grammatical accuracy by reflecting and autonomously noticing and correcting their own grammatical errors. Results suggest that engaging in such self-reflection is beneficial in allowing learners to make gains in grammatical accuracy.

Jennifer et al. (2006) have in their richly documented book ‘reflective Practice to Improve Schools’ reiterate that engaging in reflection prove beneficial not only for students but also for entire faculties. The time and effort invested in reflection yield a harvest of greater student learning, higher teacher morale, enhanced feelings of efficacy, and a more collaborative professional community.

A qualitative study was conducted by Constance (2008) on elementary school teachers to gain insight into the relationship between reflective training, instructional practice and student classroom behaviour. The study revealed four positive outcomes of the reflective model adopted for the study. They were: enjoyment of collaborative engagement and reflective critical dialogue; development of curriculum materials aligned with teachers’ collective classroom complexities, positive effect of seeing and doing reflection in practice; and positive student classroom outcomes.

Mercedes et al. (2006) describe how their knowledge has grown as they engage concurrently in both teaching and in reflection-on-action. Their article ‘Learning through Reflection in Mathematics Teacher education’ presents the different steps they have identified in the relationship between
theory and practice during their professional development. As reflective mathematics teacher educators, they could:

- incorporate new theoretical elements in their classroom practice and thereby identify critical incidents that were to be focused immediately;
- make a critical analysis of the incidents detected. They were helped to formulate the events as research problems;
- re-modify their classroom practices as the results of their research provided some new elements that were to be validated in the classroom.

As reflective teachers:

- They recognised different steps in their study. Their identification and reflection on them, and the way in which they relate to each other, has made it possible for them to characterise a way of considering the relationship between theory and practice in mathematics education;
- When engaged in critical analysis, they question the theoretical perspectives adopted, their consideration of the practice and how they relate theory and practice. The questions posed sought coherence in all of the above.
- They attempted to validate their results in their teacher education/researcher team as a means of going from individual to shared perceptions.

The study by Ogonor and Badmus (2006) examined the reform outcome of reflective teaching introduced by the faculty of education among
the student teachers in a Nigerian University during the 2002/2003 teaching practice exercise. The findings from this study indicated that student teachers were elated and had opportunity for professional growth as they practised reflective teaching.

In the article, ‘Preparing Pre-service English teachers for reflective practice’, Icy Lee (2004) explores how dialogue journals and response journals can be used to encourage reflection among pre-service teachers. Thirty-one pre-service English teachers from two Hong Kong universities participated in the study. One-group wrote dialogue journals and the other group wrote response journals throughout the two semesters on two separate English Language Teaching (ELT) methodology courses, both taught by the author. Data was gathered from their journal entries and post-study interviews. The findings show that dialogue and response journals provided opportunities for pre-service teachers to engage in reflective thinking and all of them found the experience of journal writing beneficial.

In their research study, Jukka Husu, Auli and Sanna (2008) report that the student teachers selected for their study were challenged by the procedure of guided reflection in their teaching practicum and professed that they experienced professional growth to a greater extent. Student teachers were found to question their own practices, identify social and cultural constraints, and also vision their work into the future.

In a study, a teacher educator Melanie (2008) offers suggestions for employing ‘informal reflection’ as one of the modes for engaging pre-service
teachers in reflective thinking. The educator developed the research study by asking pre-service teachers to use weblogs for personal reflection. It was revealed that as they used weblogs the teacher educands were developing their own individual approach to reflection which enabled them to identify, analyse and manage the complex issues that arise in classroom teaching.

Sheri (2008) in one of her journal articles focuses on how teacher education can support holistic teacher professional development through acknowledging and fostering the inner life. According to her, reflective practice is one such mode that can empower teachers to develop the processes of intuition, contemplation, visualisation, and imagination and thereby re-envision their practices in new ways.

The literature on reflective teaching reveals that an individual’s teaching and learning become better as a result of reflection. The major benefits identified thus far through a closer analysis of the studies conducted reveal that reflective practices can develop habits of continuous growth, integrate meaning and enhance propensity for learning. In addition to these, it is the vital and largely untapped resource for significant and sustained effectiveness and can lead into pathways of renewal and continuous improvement. It can lead learners to face constraints boldly and maximise meaning from life’s experiences. Though several studies have exploited the benefits of reflective teaching in improving the learning conditions and professional knowledge of pre-service teachers, very few studies have focused on using this as a tool for strengthening the communicative skill of
learners. This fact had urged the investigator to explore the scope of reflecting teaching in the teaching learning classroom in the Kerala set up where the majority of teacher educands are believed to be unexposed to these capacitating practices in a structured manner.

The need to introduce reflective practices led the investigator to consider certain strategies that could be employed in language classrooms and expose learners to a structured mode of reflection by which the set components of communicative competence could be addressed.

### 3.3 STUDIES ON CONCEPT-MAPPING

Concept-Mapping as a teaching and learning strategy has been extensively researched and here are a few studies that have close proximity with the research focus.

It has been well established that for learning to have a permanent impact, it is essential that learners reflect their own understandings and build their own interpretations. Concept maps have been found to bring such a transformation.

A study that examined the effectiveness of the use of ‘Mapping’ techniques for eighth grade students showed that students who mapped short expository prose passage recalled a greater number of ideas from the passage, after a twenty-four hour delay than did the control groups. The probability of recalling ideas that have been organised into a map was
significantly greater than the probability of recalling ideas that were not organised in this fashion (Amburuster & Anderson, 1980).

In one of their articles, Edwards & Fraser (1983) point out the effectiveness of Concept Maps as a genuine evaluation tool to identify a learner’s learning patterns and his ideas about a topic before and after instruction. Also, concept maps were found to be effective in identifying both valid and invalid ideas held by students.

The positive impact of Concept Mapping as a cognitive strategy on students’ achievement scores have been researched by several practitioners.

In a study conducted by Jones et al. (1985), college students and seventh-grade students who had received training in ‘matrix outlining and analysis’ (a form of graphic organizer) outperformed control subjects in both recall of unordered information about a topic of instruction and essay writing on that topic.

Yet in another study mentioned in the Journal ‘Thinking and Learning Skills’, Dansereau (1985) involved college students in a ‘Technique of College Learning’ class. Two matched groups of students studied a passage from a geology text. Students in the experimental group received instruction on conceptual frames for understanding scientific theories (a ‘Knowledge Schema’), control group subjects received instruction in concentration management. Students in the treatment group, however, outperformed control subjects on an essay-format post test that assessed recall and comprehension of the text material.
Chi (1985) studied the effect of ‘category clustering’ on pre-primary children and found that children were able to remember and extend their knowledge when the knowledge was organized into schemas, or organised frameworks.

Pankratius (1990) attempted to test if Concept Mapping, and especially, the amount of Concept Mapping would affect achievement in physics problem solving. The study was conducted in the US with high school physics students, who were most seniors and a small number of juniors. The design included three conditions: a control and two kinds of treatment groups. The control group received the course unit as usual, i.e., lectures, worksheets, reading, and writing assignments, study guides and labs. Students could work together in pairs or groups. One treatment group experienced the course unit as usual, but there was a requirement that students submit Concept Maps at the end of the unit. The second treatment group was required to make Concept Maps at the beginning of the Unit (first or second day), and were encouraged to revise them throughout the course.

The results showed statistically significant differences, with both treatments performing better than the control, and periodic Concept Mapping being more effective than Concept Mapping just at the end of the unit. The effect size between periodic Concept Mapping and Control was about 0.7. This effect amount to approximately 3 points on the post test. The study suggests that the sustained use of Concept Mapping is more effective than ‘one-shot’ isolated interventions.
In one of their studies, Beyerbach and Smith (1990) tracked pre-service teachers’ knowledge about the processes of teaching and learning, using Concept Maps that teachers constructed throughout their final year of the teacher preparation programme. They suggested that Concept Mapping helps pre-service teachers to examine professional growth as a result of changes in conceptual understanding of content and pedagogical knowledge.

Similarly, Jegede, Alaiyemola & Okebukola (1990) too attempted to test whether the addition of Concept Mapping for instruction would aid achievement and reduce anxiety (toward biology subject matter) and the results on boys and girls of ages 14 year 5 months to 18 years 2 months, were fairly dramatic in favour of Concept Mapping.

Schmid and Telaro (1990) sought to test the effectiveness of Concept Mapping on high school biology achievement and to assess this by students’ ability level. Students were randomly assigned to classes and classes were randomly assigned to treatments. The Stanford Diagnostic Reading Test was used to divide the students into the three levels of academic ability. The tests for measuring biology achievement were: a 20 item multiple choice test used as retest, and a mid-term test with 25 multiple choice and 15 matching items. In addition to 20 multiple choice items, the post test contained a number of special concept-linking and explanation items that the authors speculated would be particularly suitable for addressing the effect of concept mapping. The two groups were taught by the same teacher. The teaching was lecture based, with some laboratory work. Concept maps were being employed in
the treatment groups as an integrating and consolidating experience after some traditional presentation.

Although the Concept Mapping group generally surpassed the control on the criteria tests, the only statistically significant results of particular interest is that in the lowest ability groups, the Concept Mappers greatly outperformed the controls. The authors speculate that the Concept Mapping helps low ability students because it helps them to take an organised and deliberative approach to learning, which higher ability students are likely to do anyway.

Under the theme that Concept Mapping is effective to tackle complex tasks and promote development of higher-order thinking skills, there have been some additional observations and empirical findings. Peresich, Meadows and Sinatra (1990) discuss somewhat astonishing results that point to the effectiveness of using Concept Mapping across a curriculum and across disciplines as the primary instructional strategy to improve students’ level of comprehension in basic state-mandated reading skills assessment tests. In this study, 11th grade student test scores using traditional instruction and concept mapping instruction were observed and compared. Reading comprehension improved from 77.0% to a 99.2% pass rate, an improvement of 22.2%, written communication improved from 85% to a 97.5% pass rate, an improvement of 12.5%; theme writing improved from 47% to a 100% pass rate, an improvement of 53%. Particularly noteworthy about the line of research is the author’s observations that concept mapping activities
significantly improved students ability to think and work at the three highest domains in Bloom’s (1956) taxonomy (analysis, synthesis, and evaluation), where higher-order thinking occurs.

The fact that Concept Maps are a good way of helping a teacher organize knowledge for interaction, and a good way for students to find the key concepts and principles in lectures, readings, or other interaction material have been identified by Novak (1991), Robertson (1984), Wandersee (1990), Jonassen, Beissner & Yacei, (1993).

Beissner (1992) followed this theme using empirical methods, validating the effectiveness of using Concept Mapping to promote higher-order problem-solving skills in 52 physical therapy and 8 athletic training college majors. In this study, regression analysis was used to compare the results on a problem-solving test (dependent variable) given to a control group and an experimental group. A control group (n = 29) studied a 2,000-word text passage using traditional methods while an experimental group (n = 29) studied the same text passage by drawing Concept Maps. Regression analysis showed that there was a significant difference in the problem solving ability of the experimental group as compared to the control group. While limited, this study adds further support suggesting that Concept Mapping may be an effective means of improving students’ problem-solving ability, an educational outcome highly desired in communication scenarios of language education.
There is also indication that learning effects are enhanced when in the course of Concept-Mapping, learners adopt an active, deep and questioning approach to the subject matter. Such active, self-engaging, transformational interaction with learning material has been suggested to enhance learning in general (e.g. Feltovich, et al., 1993).

An important segment of the literature given below demonstrates how Concept Mapping can be an effective pedagogical tool to support different types of classroom tasks designed to promote learning. In these studies (Novak and Gowin, 1984; Angelo and Cross, 1993; Ditson et al., 1998 and Odom and Kelly 1998), the researchers discovered that Concept Mapping assisted their learners to extract meaning from assigned text book, or other readings, stimulated idea-creation and brainstorming, assisted in summarising a unit of instruction effectively.

The purpose of a study by Esiobu & Soyobo (1995) was to test the effects of Concept Mapping in different forms of instruction, e.g. small group versus large group, co-operative versus competitive. The study sample comprised of secondary school students and the subject matter was genetics and ecology. The design employed was a pretest – posttest, combining Concept-Mapping versus Control; Learning Condition (small group vs lecture); Academic Ability (low-medium-high); and Gender. Achievement was measured by three specially developed tests (all items multiple choice); a biology achievement test, an ecology achievement test, and a genetic achievement test. The Concept Maps were graded by the teachers. The
results were that students in the treatment conditions greatly outscored those in the controls in all learning conditions.

The goal of Hall & O'Donnell’s study (1996) was to test free recall memory of material presented as either text or as Concept Map. The researcher also wanted to see if anxiety, motivation and concentration were related to achievement. The sample comprised of undergraduate psychology class in the US. The results showed that the Concept Mapping group showed better recall for both superordinate and subordinate materials. The Concept Mapping group reported higher concentration and motivation.

Lavoie (1997) found that using a reflective wiring exercise in conjunction with Concept-mapping revealed additional misconceptions and provided more information about students’ understanding than did mapping alone.

Post-secondary data developed by Schau and Mattern (1997), found statistically significant increase in perceived accuracy of introductory statistical concepts by continually using mapping techniques as connected understanding is a prerequisite for effective and efficient statistical reasoning and problem-solving.

Semantic factors analysis made possible through Concept Maps as compared to traditional vocabulary ‘look-up’ activities gave structure to discussions for learning-disabled adolescents and resulted in better performance on measures of comprehension and concept mapping. This was
identified by Anderson et al. (1998) while analysing the effect of concept mapping on reading comprehension of adolescents.

Several studies have also been conducted to test whether Concept Mapping could reduce anxiety and increase achievement.

During an eight-week study by Czerniak & Haney (1998), students in both treatment and control groups followed a structured, give-step teaching procedure, the BSCS Learning Cycle Model, which has the following components: engagement, exploration, explanation, elaboration, and evaluation. The only difference between the treatment and control groups was that students in treatment groups performed Concept Mapping during the explanation phase of their procedure. Small groups of three to four students first generated super- and subordinate concepts gleaned from steps prior to the explanation phase of the BSCS procedure. Then they met as a full class, generated concepts on the board, and then created a concept map from the items on the board. ANCOVA was performed using the pretest results as the Covariate, to help dilute any pre-treatment differences in the students. The Posttest was the dependent variable. The results showed that Concept-Mapping increased achievement, decreased anxiety for learning physical science, and decreased general (trait) anxiety.

According to Leauby & Brazina (1998), Concept-Mapping extends learning beyond formal curriculum and develops students’ ability to ‘learn how to learn’. Because of this principle, they favour its inclusion in Accounting Education too.
What conceptual understandings students achieve in a new learning activity is highly dependent on what they already knew. Concept Maps have been used to compare students at different levels of knowledge, to track a student’s progression of knowledge throughout a course, and to identify alternative educational approaches to address misconceptions (Kinchin, 1998; McNaught & Kennedy, 1997; Passmore, 1998).

Much to Czerniak and Haney’s (1998) expectation, Concept-Mapping was seen to improve achievement, reduce anxiety towards physical science, and reduce anxiety about teaching physical science at the elementary school level.

Anderson et al. (1998) observed that Concept Maps promote meaningful learning in science and is the best mode to unfurl student’s understanding of concepts over time, and to reveal their unique thought processes. In their investigation, they found that students with learning difficulties, especially, the visual learners, were benefited by this mode of graphic representation.

In one of her studies, Barbara (1988) focused on developing technical vocabulary on teacher planning during a preservice course. Concept Maps were used to examine the growth of student knowledge concerning planning over three sequenced courses. It was noted that there was substantial growth of student teachers’ thinking and conceptual knowledge.

Jonassen (2000) is a noteworthy contributor in the area of computer-based semantic networking tools. In one of his texts, he mentions how
concept maps serve as a cognitive learning tool to promote higher-order thinking and how Concept Mapping and information technology can be combined to create a powerful tool for meaningful learning in the classroom.

An investigation of the value of using Concept Maps in general chemistry, more particularly to see if Concept Mapping could produce a more interconnected knowledge base in students, compared to ordinary instruction was undertaken by Nicoll et al. (2001). The study utilised classes that were normally taught in the different ways (there were no instructional changes made for the study to the way in which the courses were normally taught), one with traditional lecture, and one in which the teacher utilised Concept Mapping extensively, in just about all aspects of the course. The study utilised a specially developed structured interview that was used at the end of the instruction to determine the degree of interconnectedness in a student’s knowledge base. The structured interview was used instead of Concept Mapping so as not to disadvantage the students who did not do the Concept Mapping. The results showed that the Concept Mapping group knew more concepts (49 vs 38), more linking relationship (69.9 vs 46.2) and had no more erroneous linking relationships than the non-Concept Mapping students. Despite some design flaws (e.g. non-random assignment, etc.), those findings are very impressive for Concept Mapping as it relates to the development of an interconnected knowledge base.

Fraser and Spinner (2002) compared fifth-grade students in two constructivist math classes with fifth grade students in four traditional math
classes. Pre- and post testing – including conceptual map testing (Novak in Fraser & Spinner, 2002) and the Test of Mathematics-Related Attitudes – indicated that the constructivist Class Banking System (CBS) program students had dramatic results in their 1) understanding of math concepts, 2) attitudes towards mathematics, and 3) perceptions of the classroom environment. Data also showed that higher cognitive achievement was found consistently in the experimental group as compared to the control groups.

A pilot study on 12 obese patients (8 underreporting patients and 6 normoreporting patients) was carried out so as to educate them better. For this purpose, the Concept Mapping technique was employed during the interview session carried out with each patient. Their concept maps were compared to see the eventual cognitive differences between the two groups of patients. The results were favourable in that the concept maps helped in the identification of the exact problems of these patients. Franca et al. (2003) thus strongly recommend the application of Concept-Mapping in healthcare so as to help educationists take into account the patients' misconceptions, errors, and lack of learning and adapt educational programmes accordingly.

In one of their studies, Pasana and Teresa (2004) investigated the effectiveness of Concept Mapping used as a learning strategy with students in English as a Second Language classrooms. Seventy nine ESL students participated in the study. The Concept-Mapping group showed significantly greater gains from pre test to post test than the individual study group on their
use of self-regulation strategies, and self-efficacy for learning from English language text. The findings have implications for practice and research.

Akinsanya and Williams (2004) in one of their articles in the ‘Nurse Education Today’ remark that Concept Mapping could provide consolidation of prior learning from the core content and give students opportunity to gain further, wide and varied knowledge on a number of concepts in a short period. According to them, Concept Mapping is one of the most challenging learning experiences for nursing students, stimulating learning and serving as an assessing tool besides acting as a facilitative tool.

In one of their studies, Wang et al. (2008) have found that the conversion of abstracted short texts into Concept Maps could stimulate individual reflection and generate new knowledge and provide scope for viewing knowledge from another angle.

Chiou, Chei-Chang (2008) in one of his articles on the effect of Concept Mapping on students’ learning achievement and interests found that adopting Concept Mapping strategy can significantly improve students’ learning achievement compared to using a traditional expository teaching method.

Young and Lauren (2009) investigated the comparative effects of individually constructed and collaboratively constructed computer-based Concept-Mapping on middle school science concept learning. It was found that the students who collaboratively constructed concept maps created
significantly higher quality concept maps than those who individually constructed concept maps indicating deeper understanding.

The literature demonstrates that Concept-Mapping provides a framework to develop a student’s structural knowledge in a domain that in turn promotes development of higher order thinking skills essential for complex learning tasks. A close review of the studies done in this area point towards the fact that though Concept Maps have been employed excessively in science, mathematics and social sciences, they still remain to be experimented within the field of language learning with its emphasis on reflection, reformulation of ideas, substitutions of constituent parts, it can do much in strengthening language patterns, in enhancing semantic meaningfulness of the material and in a systematic presentation of language classrooms. The studies thus built an insight in the investigator’s mind for employing Concept Maps for experimentation purpose in the language learning process of teacher educands at Primary Level.

Among the other facilitative strategies that could enhance reflection among learners and lead to the deconstruction and reconstruction of ideas in unambiguous terms, it was noted that problem-solving strategy has a cardinal role to play. Given below are a few related literature that convinced the investigator to confidently experiment with this select reflective strategy.
3.4 STUDIES ON PROBLEM-SOLVING

Current educational reform movements emphasise preparing teachers for pedagogical problem solving in the classroom as learners subjected to this mode are better able to construct the central problem, elaborate the problem, relate solutions to the problem and use multiple resources to think and present coherent discourses. Studies conducted in this area under various disciplines have been documented in this section.

Flavell, (1976), Lin (2001), and Mevarech & Kramarski (2003) studied the effects of metacognition on problem in the school context with children. It was found that metacognition could improve the achievement of students regardless of inter individual differences of participants.

Eason and Green, (1987) in an article suggest the criteria for selecting appropriate problems in classrooms. According to them, problems should be based on the concerns of the learners, should have immediate and practical effects, and should encourage learners to use their own ideas and efforts to solve problems.

Bledsoe (1989) is of the opinion that learners should be encouraged to approach a problem in interesting ways such as, being given the freedom to generate as many hypotheses as possible, being praised for their contributions, being helped to develop logical arguments to support their hypotheses, and by being made comfortable.

Kamii (1989), Maker (2001), and Taba (1977) concur that inquiry, discovery, and problem solving approaches are characterized by involving the
learner in the process of creating new knowledge, not merely accumulating knowledge.

Stoessiger and Edmunds (1989) in a journal suggest that if learners are encouraged to engage in problem solving and if their initial ideas are welcomed and challenged, they will be encouraged to refine their ideas and their thinking process and refine their presentation modes. Killen (2000) too reiterates the same idea and adds that if learners are encouraged to ask several questions then they develop reflective and metacognitive skills.

Kimura (1992) believes that some thinking styles that affect the ability to solve problems are gender-linked. It was noted that a marked discrepancy exists between male and female students in visualizing the structure of a problem situation. It was found that female students could organize and relate data more efficiently than males.

West (1992) has strongly vouched for including problem solving as a teaching strategy as it influences the thinking faculty of individuals to a remarkable extent, much more than the information one reads or is been told about.

Research has found CD-ROM based case studies to be successful for allowing pre service teachers to vicariously experience the realities and complexities of the classroom and brings the theory studied throughout teacher education programmes to life by situating the learning in a practical and meaningful context and by allowing theory to enter practice through teacher’s judgements. Presenting dilemmas without clear-cut, right-wrong answers allows
students to solve problems and actively apply theory they have studied to real world problems (Shulman, 1992).

To cite Wheatley’s (1984; cited in Frensch & Funke, 1995) phrase, ‘problem solving is what you do when you don’t know what to do’. If an initial reading of a questionnaire item does not immediately bring to mind an answer, students encounter an impasse and try to get round it. The initial reading of the item generated a mental representation of what the question implies based on:

• processes of text understanding;

• assumptions about the nature of the task of completing the questionnaire;

• information that comes most readily to mind on reading the question, which may include recall of salient influences on a person’s experience of the module such as illness, availability of books, failures of time management and so on;

• degree of motivation and hence the amount of analytical thought devoted to the task.

Problem solving as a reflective teaching strategy engages students through authentic learning activities that use professional problems of practice as the starting point, stimulus, and focus for learning (Barrows 1985, 1986, cited in Shen and Tsai, 2007). In one of their quasi experimental studies they mention how problem-based learning not only emphasizes the learning of the subject area but also provides opportunities for students to practice and apply skills and knowledge acquired. In the study it was found that problem solving played a positive role in enhancing student’s computational skills.
Rogoff, (1990) found that peer feedback can reduce cognitive conflicts that students may experience during problem solving and lead to knowledge construction. Therefore, it is necessary to set up a mechanism for peer review and feedback that enables learners to attend more closely to their peers’ ideas, plans, solutions, and rationales.

Several researchers have found supportive evidences to the fact that problem solving strategy has helped learners to reflect on their own understanding of an issue, in generating appropriate vocabulary, syntactic structures suitable to generate a solution to the given problem in context (Andrusyszyn & Daive, 1997; Barrow, 1998; Stepien & Pyke, 1997).

Lin and Lehman, (1999), have observed in one of their journal articles that Reflective prompts will help students reflect upon and monitor their problem-solving processes, and explain and justify their solutions.

Jonassen, (1999, 2000); Lajoie, (2000), have proved that, ill structured problems could be effectively solved through intensive instructional support, such as modelling, coaching, and scaffolding. Students when provided with the cognitive tools essential to facilitate specific kinds of cognitive processing could solve the problems with ease.

Virtanen et al. (1999) after an analysis of medical learners’ written accounts highlight that problem solving strategy which is inquiry oriented, facilitates reflective thinking by guiding learners to reflect directly on important issues related to the given task-at-hand and make appropriate decisions.
They discuss five different problem-solving approaches. The first approach argues that problem solving consists mainly of generation of many ideas. A second approach assumes that problem solving consists mainly of new combinations of existing knowledge. A third approach highlights the power of analogies in problem solving. A fourth approach sees problem solving as transforming an initial undesired state into a desired goal state through a series of operators as described, for example, in the means-end analysis. Finally, problem solving can be viewed primarily as restructuring the representation of the problem situation. The first four approaches focus on how to arrive at a possible and promising solution. The last approach, the Gestalt approach, highlights the problem representation aspect in problem solving. In all of these approaches, metacognition plays an important role: for generating new ideas, producing new combinations of knowledge, thinking of analogies, coming up with a specific combination of operators, and restructuring the problem representation.

According to Gance (2002), the main pedagogical components commonly associated with problem solving models are:

- A cognitively engaged learner who actively seeks to explore her environment for new information;
- A pedagogy that often includes a hands-on dialogic interaction with the learning environment;
- A pedagogy that often requires a learning context that creates a Problem-Solving situation that is realistic;
- An environment that typically includes a social component often interpreted as interaction with other learners and with mentors in the context of learning.

Pedersen and Liu (2002) found that expert modelling helped students to apply effective problem-solving strategies to their work and impact the quality of their reasoning. Through expert modelling, learners are given an opportunity to observe cognitive processes of an expert, compare them with their problem-solving processes, and gradually internalise the cognitive processes of an expert (Collins, Brown & Newman, 1989).

In one of their articles Basile et al., (2003) state that in order to help learners to persevere with complex problems, the learners must be provided with rich knowledge structures with many contextual links so as to enable learners make meaningful links with their previous knowledge.

Schmidt and Ford (2003) demonstrated that metacognitive activities go hand in hand with more successful acquisition of relevant knowledge. They showed this using the real world problem of creating web pages. Chi, Bassok, Lewis, Reimann and Glaser (1989) showed that successful problem solvers more often reflect on their own problem solving. Experts compared to novices, for example, are more skilled in allocating their time during problem solving and realizing when they make errors (Carlson, 1997; Glaser, 1990). Engaging in metacognitive activities, problem solvers become aware of their strengths, but also of their limitations (Bransford, Brown, & Cooking, 1999)
and suppressing metacognitive processes during problem solving can lead to a decrease in performance.

Hugo, et al. (2003) reiterate the fact that solving patient problems and making defensible decisions is at the heart of undergraduate medical training. They feel that both competencies should be acquired in a problem-based learning environment close to reality. As for medicine, ‘reality’ means the context of real care. Challenged by the issues raised above, they developed an instructional strategy that attempts to improve the undergraduates’ diagnostic reasoning competence. Visual representations are used to make the diagnostic process explicit. The strategy provides a problem-based learning approach and real patient problems relevant to the students’ needs are selected for discussion. It also provides a comprehensive framework for rapid, though critical appraisal of evidence-based along with experience based knowledge of clinical data. In addition, it encourages students to analyse the risks, benefits and cost-effectiveness of each significant diagnostic action.

A sample of 202 students filling in a student evaluation of teaching (SET) questionnaire were asked to complete another questionnaire asking about the specific reasons for awarding a score to the specific SET questionnaire items. The aim was to find out what influenced students’ judgements on those items. It was found that students’ interpretation of some questions differed from the ‘expected’ interpretation. Several factors, such as the placing of questions and the salience of items retrieved from memory, could influence a score. It was also found that asking for an explanation improved scores overall. The conclusions
were that questionnaire completion could be understood as a form of problem solving and judgement under uncertainty. The specific heuristics used led to variability in students’ interpretation of the task (Robertson, 2004).

Joanna and Martin (2004) deal with a teaching approach aimed to help students become aware of targeted techniques of significance in problem solving. The teaching approach is to present a series of tasks that can be solved by applying the same technique. Two levels of prompting are used; first for the students to realize solutions without necessarily being cognizant of the technique, second for them to perform further mathematical modelling that should highlight the similarities in solution shared by all the tasks. In the fieldwork, a teaching sequence based on this approach is implemented for a technique involving enumeration via constructing a bijection. Certain factors in the students’ behaviour suggested that their realization of the technique at the end was not as secure as desired. It was found that to attain a new technique as a problem-solving tool, the students had to develop skills in reflection and gain awareness of a technique, and identify application and execution phases of the technique so as to solve problems feasibly.

Erik and Lieven (2004), present the CLIA-model (Competence, Learning, Intervention, Assessment) as a framework for the design of learning environments aimed to be powerful in eliciting students learning processes that facilitate the acquisition of productive knowledge and competent learning and thinking skills. Through their study they found that the learning environments that focused on the acquisition by the pupils of an overall cognitive self-regulation
strategy for solving mathematical problems consisting of five stages were powerful in facilitating students for the acquisition of high-literacy learning, especially the acquisition and transfer of self-regulation skills for learning and problem solving.

Whereas no significant difference was found between the experimental and control groups on the word problem test during the pretest, the former group significantly outperformed the latter during the posttest, and this difference in favour of the experimental group continued to exist on the retention test. The learning environment had also a significant, albeit small, positive impact on children’s pleasure and persistence in solving mathematics problems, and on their mathematics-related beliefs and attitudes as measured by a self-made Likert-type questionnaire (effect size .04).

The results on a standardized achievement test showed that the extra attention during the mathematics lessons for cognitive and metacognitive strategies, beliefs, and attitudes in the experimental classes did not have a negative influence on the learning outcomes for other, more traditional parts of the mathematics curriculum. To the contrary, there was even a significant transfer effect; indeed, the experimental classes performed significantly better than the control classes on this test (effect size, 38).

The analysis of pupils' written notes on their response sheets of the word problem test showed that the better results of the experimental children were paralleled by a very substantial increase in the spontaneous use of the heuristic strategies taught in the learning environment (effect size, 76). This finding was
confirmed by a qualitative analysis of the videotapes of the problem-solving processes of three groups of two children from each experimental class before and after the intervention.

Furthermore, not only the high and medium ability pupils, but also those of low ability benefited significantly - albeit to a smaller degree - from the intervention in all aspects just mentioned.

The purpose of the article by Youngmin and David (2005) was to introduce the design of a cognitive tool for external representation of knowledge to support problem-solving performance. The prototype of the tool was developed based on five design principles leading to effective problem-solving performance: combinational representation, contextual enhancement, spatial flexibility, property association and multiple representations. The rationale and basic assumptions of tool development were as follows.

Principle 1. Learners can solve problems more effectively when the conceptual and corresponding procedural knowledge are represented together than when they are represented as separate artefacts.

Principle 2. Learners can solve problems more effectively when the solver’s context reflecting the problem context is described than when the problem is decontextualized from the problem situation.

Principle 3. Learners solve problems more effectively when the number of representable concepts is not restricted by the physical space of the medium than when they are restricted by space limitations.
Principle 4. Learners solve problems more effectively when the magnitude of association of concepts with processes is classified than when the magnitude of associations is not classified.

Principle 5. Learners solve problems more effectively when the concepts are represented in multiple modes of information than when modes of information are constrained to one mode.

The end result according to them could be a tool that optimizes the external representation of internal representations, distributes knowledge more efficiently and improves the process of finding solutions to complex problems.

Hammersley-Fletcher and Orsmond (2005) have indicated that reflective practice involves the process of teaching and thinking behind it, rather than simply evaluating the teaching itself.

Problem solving or action research activities according to Mc Niff and Whitehead (2006) are “a form of inquiry that enables practitioners everywhere to investigate and evaluate their work”. It is based on a spiral of action that involves planning, acting, observing, and reflecting says Costello (2003).

In a two-year evaluation study, creative problem solving was customized for general education intervention teams in elementary schools. In the first study, 24 general education teams were randomly assigned either to a critical problem solving for general education training condition or to a control group. Team outcome measures were tracked over the course of a school year, and the critical problem solving for general education training teams consistently demonstrated superior performance relative to controls across all measures.
One year later, a second study investigated 2 approaches to delivering training in critical problem solving for general education training teams. Five teams received critical problem solving for general education training directly from university-based staff, and 9 teams received training from employees in their district who had previously received critical problem solving for general education training from the university-based staff (a “train-the-trainers” approach). Schools receiving training from their own staff performed as well as the independently trained schools, thereby providing support for the train-the-trainers approach (Michael, et al., 2006).

Carlos and María-Pilar (2007), in a case study, examined the performances of 18 10th-grade students (age 15–16 years) in the process of performing problem-solving tasks in the physics and chemistry laboratory. The study focused on different types of problems arising in the process of transferring responsibility to students in a context of teacher assistance to autonomous problem-solving. The students’ conversations were audio taped and videotaped, and their productions collected. Problems were found in relation to excessive task difficulty, to stereotyped school culture reflecting procedural display rather than genuine problem-solving, and to problems related to within-group interactions and roles. It was noticed that the cases selected had enhanced procedural level of thinking, and had developed meticulous planning and interpretation strategies owing to their exposure to the problem-solving strategy.

The purpose of a study by Salih and Erdat (2007) was to determine if there are relationship among freshmen students’ Field depended or field
independent (FD/FI) cognitive style, conceptual understandings, and problem solving skills in mechanics. The results indicated that students conceptual understanding were not statistically related to their FD/FI cognitive styles for both pre and post results. However, their problem-solving skills were statistically related to their field dependent and field independent cognitive style.

A paper presents an innovative way in which university education can help pre-service teachers become better problem-solvers. The authors Alexandros and Constantinos (2007) use the “Technology Fair” as a means for promoting pre-service teachers pedagogical content knowledge about technological problem solving skills. Pre-tests, mid-test and post-tests were administered to the pre-service teachers before, during, and after the preparation of the technology fair, respectively. A number of pre-service teachers were selected and interviewed after the completion of the technology fair. Data were also collected from reflective diaries kept by the pre-service teachers during the preparation phase of the technology fair. Analysis of the results indicates that the technology fair contributes to the development of positive values and attitudes in technology education and has a significant influence on improving pre-service teachers understanding and application of problem solving strategies within the domain of technology.

Speaking from the perspective of cognitive science, Balcaen (2008) argues that teaching problem solving and critical thinking is a means of improving scientific thinking while engaging more powerfully with the factual
content. Based on his work with several thousand Canadian and international teachers, Case (2005) takes the position that, rather than compete with the teaching of subject matter and other skills, teaching critical thinking can support their development. Case also argues that this support depends on two distinguishing features, allowing teachers to place critical thinking on the main stage using a curriculum embedded approach, and emphasizing teaching the intellectual tools required for critical thinking.

The studies and literature reviews considered in this section point towards the fact that anchoring learning activities to a problematic task motivates learners for further involvement and collaborative discussions and in actively participating in reconstructing ideas systematically. This is what is felt essential in a communicative context.

The third reflective teaching strategy that has a potential role to play in enhancing the communicative competence of learners is Portfolio Writing. With its emphasis on quality management, social awareness and systematic presentations, portfolio preparation can be expected to create an awareness of one’s language processing modes and its subsequent refinement and renewal.

An attempt has been made to document some literature pertaining to this area that highlight the progressive merit of the select strategy. Studies in connection with the various types of portfolios have also been catalogued for ease in comparison.
3.5 STUDIES ON PORTFOLIO

Portfolio is one of the alternative methods in education used in the assessment of the students’ individual or group performance. Necessity of using Portfolios has been emphasised by many researchers. Literature review and studies in close proximity to the present research are discussed below.

Seldin (2004) offers the following reasons for preparing a teaching Portfolio:

- To gather and present hard evidence and specific data about their teaching/learning effectiveness to tenure and promotion committees.
- To provide the needed structure for self-reflection about the areas of their teaching needing improvement.
- To foster an academic environment where discussion about teaching practices becomes the norm.
- To share teaching expertise and experiences with younger faculty members.
- To have a written legacy so that future generations of teachers will have the benefit of their thinking and experience.

Several studies reveal the specific purposes served by Portfolios. Portfolios are seen to show growth over time (e.g. Elbow, 1986; Politano et al., 1997) and to provide assessment information that guides instructional decision-making (e.g., Arter & Spandel, 1992; Gillespie et al., 1996; Le Mahieu, Eresh, 1996).
To Gillespie et al. (1996) Portfolios are purposeful, multidimensional processes of collecting evidences that illustrate a student’s accomplishments, efforts, and progresses over time.

Lincoln and Guba (1984) in their study state that the collection of evidences from different sources for preparing Portfolios helps learners to see patterns and organise events in an impressive way so as to communicate their idea clearly across others.

Glaser (1990) makes reference to the work of Hatch and Gardner who suggest that students’ portfolio can be assessed in terms of different dimensions such as ‘conceptualisation, presentation, competence, individuality, and co-operation.

Glaser suggests that as proficiency develops, knowledge becomes increasingly integrated, new forms of cognitive skill emerge, access to knowledge becomes swift, and the efficiency of the performance is heightened. Information gets structured appropriately, and coherence and acceptability to interrelated knowledge grows greatly. Such self-regulatory skills as checking appropriateness of strategies, judging the difficulty of the task, apportioning time, asking questions about the task, predicting outcome of performance, etc. enhance the repertoire of learning skills.

Broadfoot (1986); Francis (1994); and Smith (1994) in their research studies have highlighted the importance of dialogue, interview, or learning conversation in making an objective assessment of Portfolios.
In their investigative studies too Mumme (1991); and Romberg (1993) have found that in order to assess the skills acquired by students while engaging in Portfolio preparation, it is essential to expose learners to questions of an open-ended problem solving nature rather than to multiple choice tests. They need to be assessed through both the oral and written modes (Shepard, 2000).

In considering the use of Portfolio with students in the classroom, Morgan citing Mitchell (1994) states: they are excellent tools for informing through feedback and the evidences gathered encourages students to work cooperatively, to question and evaluate their own and others’ work and to develop their judgemental skills.

Portfolio, the open-ended and un-graded task designed to explore teaching from many different vantage points have been used in the preservice teacher education program at Monash University to help student teachers to reflect on their learning about learning and teaching and help them to convey this to others. Loughran and Corrigan (1995) of this university in an article on Teaching Portfolios observe that Portfolios helped student teachers’ understanding to evolve and unfurl into a meaningful whole as they completed their preservice teacher education program.

Studies by Birgin (2003), Gussie (1998), and Micklo (1997), throw light into the fact that Portfolio gives more reliable and dynamic data about students for teachers, parents, and also the student himself.
Freidus (1997) describes a case study in which a teacher whose initial pedagogy for teaching was based on the traditions and practices of direct teaching was reformed through the use of reflective portfolio. It enabled her to present and validate what she was learning.

Koretz (1993; cited in Herman and Winter, 1994) found a correlation ranging from .47 to .58 between Portfolio scores and multiple-choice maths test scores and a similar correlation between writing Portfolio scores and direct writing assessments.

However, Gearhart and other (1993; cited in Herman and Winter, 1994) found no relationship when comparing writing Portfolios with standard writing assessments but found correlation in the 0.6 range when Portfolios were scored in two different ways (holistic and individual pieces scored).

Nystrand, Cohen and Dowling (1993) found that reliability of Portfolios could be significantly improved if:

- Raters scored each task in response to a prompt before moving to the next task, and
- Raters read several examples together to decide how they were to be rated.

Ashbacher's (1993) action research cited in Herman and Winter (1994) suggests that teachers’ instructional practices and their attitudes towards students changed when Portfolios were implemented for classroom instruction.
Richardson’s (2000) study involved classroom observations, teacher and student interviews, and examination of student writing and teacher response and found that students were hesitant to make independent judgements largely because of the threat of grades.

Gipps (1994); Frederiksen & Collins (1989); Sadler (1988) in their research articles observe that Portfolios reveal both the process and product of learning.

Julius (2000) in his doctoral dissertation writes that Portfolios reveal a wide range and comprehensiveness of evidence, variety and flexibility in addressing purposes. Arter and Spandel (1992); Gillespie et al. (1996); Herman Aschbacher and Winter (1992) too had observed in their studies that Portfolios are a reflection of one’s effort, progress or performance in one or several subjects.

Potter (1999); Law & Eckes (1995); Richter (1997) investigated the effect of Portfolios on specific audiences in different areas, like in childhood classes, for children with special needs and in elementary classrooms for science. Learners exposed to this strategy showed an increasing level of progress in their respective subjects.

Several studies have proved that Portfolios could be effectively used in teacher-education programmes to refine one’s teaching and presentation skills (Kinchin, 2001; Klenowski, 2000; Mac Laughlin & Vogt, 1996, Schonberger, 2000).
Anthony et al. (1991) while evaluating literacy proved how portfolios reflected the individual learning style of students and made the assessment of their work more authentic. This view has been substantiated by the research study conducted by Gardner and Boix-Mansilla (1994) where they observe that understanding the learning style of pupils would enable teachers to adjust instruction and support further learning.

Kuhs (1994) in one of his journal articles mentions how mathematical concepts could be taught effectively through Portfolio preparation.

Howard and Le Mahieu (1995) tried to increase the writing skill of pre-k-8 students through Portfolios and found it to be more effective than the usual way of teaching learners how to write.

Research findings (Shulman, 1998) suggest that when students create their Portfolios they develop important skills such as critique, reflection and self evaluation for development and improvement of learning. This process of Portfolio development helps to validate students’ constructed meanings.

Reese (1999) in his article states how Portfolios initially entered high schools in performance-based disciplines such as fine arts, then in writing classes, and how it expanded to be used across many disciplines such as science education, academic and music education. These findings have been endorsed by Konet (2001), Weaver (1998) and Durth (2000).

Carney (2001); Quesada (2000); Young (2001), Yancey and Weiser (1997) in their doctoral dissertation have proved the use of electronic Portfolios in higher studies to document one’s learning and understanding.
The studies given below show how Portfolios create scope for self-reflection and development of meta-cognitive skills.

Julius (2000) examined elementary students’ perceptions of Portfolios by collecting data from 22 students and their teachers from two third grade classrooms. Data collection included student and teacher interviews, observation of student-teacher conferences, Portfolio artefacts, teacher logs and consultations with teachers. Portfolios were found to contribute to students’ ability to reflect upon their work and to the development of students’ sense of ownership in the classroom. As students became more used to using the language of assessment in the classroom, they were seen to be more confident in explaining their learning to parents and others.

Flutter et al. (1999) in their article ‘Thinking about Learning, Talking about Learning’ and Klenowski (2004) in his book profess that the use of Portfolios for assessment purposes provide a new perspective on learning and is closely aligned with pupils’ views of successful learning activities. That is, they provide opportunities to be creative and inventive; incorporate novelty and challenges; offer choice and a sense of ownership; and raise awareness of progress.

In making her case for the benefits for learning of Portfolio assessment, Klenowski (2000) cited evidence to show that lecturers gained understanding and important insights through their experience of using portfolio assessment.

Keeping a reflective portfolio could help develop teaching practice is the premise that developed out of the two-month pilot-study undertaken by
Rema and Marg (2002) involving new teachers, experienced teachers, and principals at primary school level. The reflective portfolio when teamed with reflection and action, collegial dialogue, and making links between theory and practice could positively influence the way teachers achieve improvement in their classroom practices.

To Barrett (2002) Portfolios are a means to an end to support reflection that can help students understand their own learning and to provide a richer picture of student work that documents growth over time.

In a case study described by Klenowski (2002), the Portfolio served the purposes of formative and summative assessment. The formative function of the Portfolio is met as student teacher reflects on his learning process, understand his strengths and weaknesses, dialogues with colleagues about his performance and set targets for himself and as a summative tool, it gave an overview of the achievements of the student teacher with reference to criteria and standards.

Paschal et al. (2002) reviewed the use of Portfolios as an assessment tool in physical therapy programmes and reached the conclusion that engaging in a mentored, collaborative, and reflective process of Portfolio development could enable students, practitioners, and teachers to make better sense of what they were doing and plan for continuous improvement stimulated by critical self-assessment of what they have done. They found the process of building Portfolios supportive of developing reflective
practitioners who continuously assess their own performance and plan for ongoing learning and development.

Reis and Villaume (2002) used a case study approach to assess the benefits of Portfolio assessments on preservice practitioners and their cooperating practitioners. Practitioners in this study frequently mentioned increased reflection as a benefit of the Portfolio. The portfolio also contributed to the development of skills through increased organization and planning efforts.

Other studies have indicated that Portfolios provide for real-world applications and assessment, and that they contribute to ongoing professional development by fostering the development of reflection, scaffolding practical on-the-job skills, and prompting job interview preparation (Dollase, 1998; Klewonski, 2000; Synder Lippincott & Bower, 1998).

Edgerton, Hutchings, and Quintlan (1991), Dan Tompkins (2001), Seldin and Higgerson (2002) point out that the very process of creating the collection of documents and materials that comprise the Portfolio stimulates the practitioner to ponder personal teaching activities, organise priorities, rethink teaching strategies, and plan for the future. They opine that the Portfolio is a particularly effective tool for instructional improvement because it is grounded in discipline-based pedagogy. That is, the focus is on teaching a particular subject to a particular group of students at a particular time.

Miyata (2003) attempted to study how web-based Teaching Portfolio and Video-on-demand Assessment Program could be used for microteaching
by students prior to practical teacher training. The evidences and reflections made it easier for teachers to deploy effective microteaching by enabling teachers to strive for classroom teaching improvement on their own.

Portfolios were found effective on leadership effectiveness, student achievement, professional development of teachers, and the reflective practice of the principal in a phenomenological study undertaken by Marcoux et al. (2003). The school district chosen for the study was a rural consolidated pre k-12 district in New York that used the principal portfolio as an evaluation tool. Data were collected through structured interview questions answered by the superintendent and 2 assistant superintendents, interviews with 5 principals, focus group that involved 10 teachers, and responses to the Reflective Performance Scale (Brown and Irby, 2001) by all participants. Test scores from the school district were used as measures of student achievement. The Portfolio process was perceived to enhance the reflective practice of the principal by facilitating collaboration and communication.

Scholes et al. (2004) found that Portfolios captured learning from experience, enabled an assessor to measure student learning, acted as a tool for reflective thinking, illustrated critical analytical skills, and evidence of self-directed learning and provided a collection of detailed evidence of a person’s competence. The data were gathered from 122 students and 58 nurse teachers who were interviewed about their perceptions of Portfolio use. The study revealed that to achieve maximum benefit from the Portfolio as a learning tool that linked theory and practice, there needed to be a clear fit
between the model of Portfolio and the professional practice that is to be assessed.

In teacher education, the use of Portfolios has gained momentum in the United States recently, due in part to standards-based reforms of education. Teachers are being required to demonstrate that they meet certain standards, before they can gain a teaching license (Delandshere & Arens, 2003). As observed by Kimball (2005); Strudler & Wetzel (2005), Portfolios are being used in many institutions as part of the graduating requirements of their students. Portfolios are seen as a way of assessing the learning and teaching abilities of student teachers and beginning teachers, to see whether they meet these teaching standards.

De Rijdt et al. (2006) in their exploratory study tried to find the effects of Teaching Portfolios in Higher Education by examining the attitude of teachers towards its use. The study showed that not very many teachers used Portfolios but when used, they were stimulated to reflect on their own teaching and were able to actualise the learning content. They could improve upon their course material too.

Zellers and Mudrey (2007) observe that for a learning Portfolio, in order to reach its goals, students must learn the reflective process as early as possible.

One of the great difficulties of using Portfolios as pointed out by Zellers and Mudrey (2007) is that Portfolio changes the course of the classroom by consuming too much of time for its preparation. For students to use Portfolios
well, they suggest that teachers need to be taught how to assist their learners in preparing one without much difficulty.

Some are of the opinion that scoring Portfolios can be a very time consuming task especially in a crowded classroom (Birgin, 2003; De Fina, 1992; Lustig, 1996; Chen et al., 2000; Lankes, 1995). They however suggest that the use of checklists, rubrics and digital portfolio form reduce time for the assessment of it.

But as the research by Vavrus and Collins (1991) on the use of Portfolios for assessment purposes in teacher education has found, the experience of developing a Portfolio facilitates the development of the following skills and understanding:

- higher order skills (problem-solving, analysis, synthesis, evaluation, creativity);
- self-assessment and critique of own work, teaching, and learning experiences;
- understanding of own learning processes;
- self-regulation and self-direction in own learning, reflectivity through examination of own beliefs and concepts;
- enhanced professional identity and skills;
- growth and commitment to growth;
- personal control through taking responsibility and ownership of own work;
• understanding the use of own strengths and successes (important for adult learners);
• appropriate professional behaviour through continuous learning role-modelling.

The extensive review of the literature has revealed extensive benefits for the use of Portfolio as an assessment and learning tool for all levels of education. The pay off for enhanced student learning is well worth the investment of time, energy and other resources. The authors also suggest that appropriate staff development needs to be designed for all levels of the system, including parents and the community.

A review of reflective practices and its allied strategies have shown that it is high time that teachers are groomed in reflective practice. For teachers to incorporate such innovative practices essential training programme can be fruitful to a certain extent. More needs to be done to restructure the training programmes for teachers. The final section of the review thus points towards the need to revamp teacher education programmes and thereby create a lasting impact on student learning and achievement.

3.6 STUDIES ON TEACHER EMPOWERMENT

Knowledge about and practice of certain pedagogical approach to successful teaching of thinking deserve a significant place within the knowledge base for teacher education. The investigator has presented some
studies that help understand the effects of certain teaching behaviours on student outcomes in higher-order thinking.

A growing body of research examines the area of teaching as a cognitive activity. Herrick (1962) in one of his articles underscored the need for teachers to use critical thinking in identifying important understandings and processes when preparing instructional objectives. Taylor (1970) analysed teacher ability to plan systematically. Marland (1982) developed three models of teacher thinking.

From the aforementioned studies, one can see a current call for a ‘paradigm shift’ in research on teacher education: a shift away from the process-product approach (Shulman, 1986) and toward a cognitive paradigm that examines the effects of the thinking and decision-making that teachers do while interacting with students (Clark and Peterson, 1986).

Dietz (1985); Savell (1986); and Whimbey (1975); and several other researchers have documented the measurable classroom effects of explicit efforts to improve the cognitive functioning of students in elementary and secondary schools. Positive differences were found not only in student performance in certain generic cognitive skills, but also in students’ general academic achievement. Researchers conclude that this latter improvement can be attributed to the provision of previously missing cognitive prerequisites for the learner.

Certain teacher behaviours have been identified as productive for moving student thinking to higher levels. For example, Costa (1985)
discusses the importance of ‘open response’ behaviour in discussions, accepting tone, probing questions, clarifying statements, teacher modelling of rational behaviour, and appropriate use of silence during discussions.

An exciting study of higher-order thinking high-school social studies by Newman (1988) analysed the teacher behaviours that resulted in improved higher-level cognitive functioning in high school students. Among the teacher factors that contributed to measurable improvement in students in this area were: providing sufficient time for students to respond in discussions, the posing of challenging intellectual task, problem-solving behaviour, and giving students the expectation that they will offer explanations for their conclusions.

Martin and Jonas (1986) found that students’ achievement on standardised measures of reading comprehension, math computation, and math concepts improved significantly in comparison with a control group as the result of an explicit focus on such cognitive processes as comparison, classification, and pattern identification using the thinking skills program.

Newman (1988) too interviewed teachers to identify the problems that encumber the teaching of thinking. Among those were lower skills assessed by mandated tests, the usual school pressure on teachers to ‘cover’ certain amounts of content, and the lack of administrative support for higher-order thinking. Interestingly, this study does not report that teachers saw any barrier to students’ ability to reach greater ‘thoughtfulness’.

Pugach and Johnson (1990) conducted a study on the use of structured dialogue process with general education classroom teachers to
promote reflection on how to more effectively support students with learning and behaviour challenges in their classrooms. Teachers were coached through the steps of reframing the problem through clarifying questions; summarising insights from the reframing process, including identification of behaviours that need to be controlled; generating potential actions and predicting the outcomes of each, and developing a plan to evaluate the proposed change. When compared with a control group of teachers, those who participated in the structured dialogue significantly increased their tolerance of student behaviour, shifted their attention from student-centred to teacher-centred problem orientations and increased their confidence in dealing with classroom situations.

Brock, Yu and Wong (1991) conducted a study on teachers to assess the impact of Collaborative Diary Keeping. Throughout a 10 week teaching term, they keep diaries on their teaching, reach other's diaries, and discussed their teaching and diary keeping experiences on a weekly basis. Teachers reported that this technique brought several benefits to their development as second language teachers. Besides raising their awareness of classroom processes, it prompted them to consider those processes more deeply than they may otherwise have. It served as a source of teaching ideas and gave them a way to observe one another’s teaching from a ‘safe distance’.

Riding et al. (1995) argued in exploring and developing new pedagogical models for learning that the teacher contribute greatly to
education theory and practice if he is positioned to perform the dual role of a producer and a user of knowledge, which is the reflective process.

The success of reflective teaching requires the cooperation of staff partnership schools with student teachers by providing a conducive school climate and required material resources. On the other hand, student teachers are required to produce their own writings about their experiences as learners and teachers. Epstein and Kappan (1995) draw a positive association between partnership of education stakeholders and students outcome. In this case, student teachers could grow professionally by the collaboration with the staff of partnership schools in a caring community.

Research conducted by Galton and Hargreaves (1996) suggests that smaller class provides teachers with the opportunity to devote more time to each student with regards to talking about tasks, giving feedback on work, and the like. However, Zahorik et al. (2003) indicate that class size reduction alone does not always end up with high student performance. According to them, it is cardinal that teachers acquire and practice effective teaching strategies.

The purpose of a case study by Raymond (2000) was to investigate six preservice teachers’ understandings of the theory and practice of teaching and learning foreign language during their course work and field experiences in a teacher education programme. In discussions of how to teach the language, the participants outlined the need for teachers to provide a language-rich environment in which students are guided to use the foreign
language to express their own meanings and to gain information from others and from authentic tasks.

Elizabeth, Vivian, and Joyce (2003) in one of their studies examined the perceptions of preservice teachers who were required to develop an electronic portfolio as part of a preservice teacher education programme. Most participants concluded that the electronic portfolio assessment was a more authentic method of assessment for their work.

Lau et al. (2003) reported that students’ achievements deteriorated significantly with increase in the difficulty level of the mathematics problems assigned to them. Furthermore, Brown (2003) found that teachers generally possessed positive attitudes towards problem solving but were rather weak in their abilities to solve problems. Utsumi and Mendes (2000), on the other hand, reported significant differences in attitudes toward mathematics based on variables such as types of schools, stage of schooling, age, students; understanding of mathematical problems solved in class, and students’ achievement in mathematics.

Christopher et al. (2004) observe that the Reflective Cycle caters to the Learning styles of the ‘Activists’ – who learn best by getting involved in an activity ‘‘Reflectors’’ – who learn from reviewing experiences’; ‘Theorists’ – who think things through carefully and find out more; and ‘Pragmatists’ – who plan and try things out, using common sense.

Ogonor (2006) attempted a study to examine the reform outcomes of reflective teaching introduced by the Faculty of Education among the student
teachers in a Nigerian University during 2002/2003 teaching practice exercise. Three hundred and four students who were in the penultimate years of graduation comprised the sample of the study. Six research questions were raised to direct the thrust of the study. Four sets of instruments were used. They were all open-ended, targeted on eliciting information on student teachers’ activities and support by teachers of partnership schools during the teaching practice, perception of student teachers’ performance by faculty and mentor teachers, as well as the challenges encountered by trainees during the exercise. The finding from this study indicated that student teachers were elated and had opportunity for professional growth as they practised reflective teaching. Student teachers enumerated the constraints they had to perform effectively during the teaching practicum, as intense pressure for time, inability of school authorities to provide required basic materials and non performances of the role of mentoring staff of partnership schools.

In a study focused on investigating different ways to gather student feedback, Hoban et al. (2006) found that interviews by a teacher educator with students were more useful than learning logs written by students, observation schedules completed by students or survey completed by students and teachers in gathering student feedback to enhance teacher reflection.

Kabilan (2007) points out the need to restructure Teacher Education Programmes so as to equip prospective teachers to systematically incorporate both the theory and pedagogy of cognitive skills like problem-
solving, critical thinking, metacognition, and the like so as to fulfil their responsibilities in the emerging global scenario.

In one of his articles, he reports the practice of reflecting on reflection by future English language teachers in the Malaysian context. In the first phase, they (a) self-examine their practices by (writing their own reflections and reading others’ critiques of their practices) and b) examine others’ practices (by critiquing others’ practices and providing suggestions). These activities were seen to have inspired an awareness of their development and of current professional knowledge. Also, participants were able to identify the changes they need to make to become more effective teachers. In the next phase, reflecting on their reflections they were able to internalise pedagogical knowledge and practices that were useful to them, their linguistic capabilities and positive attitudes and skills.

Atay (2008) in a study presents an INSET programme in which Turkish EFL teachers were provided with relevant theoretical knowledge along with guidance for research, reflection, and collaboration. Results of the study showed that although teachers faced difficulties in conducting and reporting their research, the programme had a positive impact on their professional development.

Lessons Transcriptions were employed by Harfitt (2008) to arouse greater classroom language awareness and promote reflection in one of the teachers selected for the study. Her attitude underwent a transformation following her exposure to lesson transcriptions taken from another teacher
working in a different school but who was teaching the same subject content as she was. Lesson transcriptions thus served greater purposes than video-recording in promoting self-reflection, and raise awareness of classroom interaction, and exert a powerful influence on teaching and learning.

In a study by Farrell (2009), preservice teachers taking a course in teaching English as a second language were asked to trace the conceptual change that had occurred in them through Concept Maps. Results indicate that the course had some impact on the participants’ prior beliefs and that concept maps may be a useful tool for tracing conceptual change.

Kian-Sam Hong, Kock-Wah, and Kim Leong (2009) assessed the effectiveness of an online mathematical problem solving course designed using a social constructivist approach for pre-service teachers. Quantitative and qualitative methods were used to evaluate the effects of the online learning course. Findings showed that a majority of the participants were satisfied with their learning experiences in the course. There were no significant changes in their attitudes towards mathematics, while the participants’ skill in problem-solving for ‘understand the problem’ and ‘devise a plan’ steps based on the Polya Model were significantly enhanced. The results also showed that there were significant improvements in the participants’ critical thinking skills. However, there were no significant differences in the participants achievements in the course based on Gender.

The main purpose of a study by Melek (2009) was to determine student teachers’ perceptions concerning the effects of class size with regard to the
teaching process. The study revealed that there is a direct relationship between class size and motivation, teaching methods use, classroom management, and assessment according to student teachers’ views.

Mikeska, Anderson and Schwartz (2009) in their study have developed frameworks and strategies aimed at helping the preservice teachers with whom they work to become ‘well-started beginners’ who are ready to address problems of science teaching. The educators purposefully engage the candidates in focused dialogue regarding challenges or problems of practice that will likely face in their work. They use a dialogic third space to help the preservice teachers reconsider and develop deeper understandings of these problems of practice.

Parkinson (2009), in one of his case studies found that empowering future teachers as reflective professionals requires teacher education programmes to structure learning experiences that model reflective practice and facilitate the development of engaged learning communities. Through case study research a group of preservice teachers were able to gain a contextual understanding of early adolescents that not only impacted their perception and understanding of the target age group but also allowed them to negotiate their preconceptions.

The evidence to date support a systematic and explicit focus on teaching thinking skills. It remains now for teacher educators to examine the implications of this evidence for the revision of teacher preparation programmes and the relevant questions to be answered.
A systematic revision of teacher education programmes that would incorporate higher-order thinking skills should include at least the following: Courses in which the knowledge base about cognition and cognitive processes is a fundamental and explicit part; methods that promote higher level student thinking; practicum experiences that provide student teachers with a variety of models for the teaching of thinking, as well as opportunities to practice them and receive productive feedback from both a superior and a cooperating teacher who are committed to the improvement of children’s thinking, information about and practices with a variety of student assessment tools will appropriately identify higher level cognitive functioning on the part of the learner.

The studies reveal the significant role teachers have to play in supporting students’ learning processes and in developing students’ multiple intelligence and life long self-learning abilities. Teachers need to be life long learners able to articulate their teaching with the new paradigm of learning. This realisation that emerged from a close scrutiny of the research reviews formed the backdrop for undertaking the present study of its kind and for adopting reflective practices to enhance the communicative abilities of teacher educands at Primary Level so that through a systematic process of deconstruction, construction, and reconstruction of ideas, teacher educands could become empowered trailblazers and trendsetters in education. The methodological approach adopted for this purpose are outlined in the succeeding chapter.