Chapter – I

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INTRODUCTION

During the last two decades there has been a sharp increase in awareness amongst all connected with education regarding the need for maintaining and improving quality in educational institutions and desirability of adopting formalized quality assurance procedures.

With an increasing number of students clamouring for an opportunity to acquire knowledge and skills, stringent financial constraints pervading the educational system, the public demanding efficient services and important sections of society believing that education is core business segment and education acquiring an international dimension, it is natural that the focus in the world of education is on providing quality education.

In a teaching-learning situation three components are involved viz., the teacher, the learner and the subject matter to be processed.

1.1 INTRODUCTION

In accordance with UNESCO (1977), “Education is an organized and sustained instruction designed to communicate a combination of knowledge, skills and understanding valuable for all activities of life”. If, instruction is not made to contribute effectively to education, the aims of education cannot be realized. It is a means employed by the teachers, designers of material and curriculum specialists to promote learning. A planned instruction has the purpose of helping each person to develop optimally in the direction of his own tendencies, innate or acquired.

Instruction carried out in schools of a democratic nation tends to accord high priority to develop creativity, independence of thought, self-direction, self-discipline and co-operative human relationships. Contrarily, instruction in an autocratic nation stresses upon the development of conformity, intellectual compliances, conditioned response to imposed discipline and uncritical dedication to the state’s system of values.
An instruction process encompasses most of the activities taking place in the classroom and the school as well as many activities taking place in the home. In addition, virtually, any aspect of instruction-duration, source, group size, nature of the instructional activities and specific teacher or student behaviour – is legitimately included in the construct “instruction process” (Weil and Murphy, 1982).

Instruction may be thought of as the sequence and arrangement of the external conditions of learning in such a way that will optimally interact with the internal capabilities of the learner so as to bring about a change in their capabilities (Gagne, 1965). It is a highly complete and dynamic process that involves people in the use of instructional strategies, that serve a number of functions – and it is concerned with the environmental constraints and climates (Lee, 1983).

In the present study, two types of instructional treatment have been compared, firstly, teacher directed instruction followed by peer tutoring and secondly, traditional instruction.

For teacher directed instruction, the lesson plans were developed in advance, keeping in mind the instructional objectives, entry behaviour of learners, instructional aids, instructional sequence and other teaching-learning experiences.

Traditional instruction is the approach of teaching in which the teacher is the center of the classroom activities of teaching-learning process. According to Good (1973) Traditional instruction is that type of teaching, which is an outgrowth of custom or common practices. It is the teacher who presents the entire content to be learnt in the final form. In this approach, the student is not required to make any independent discoveries. The terms connected with traditional instruction are expository, conventional and lecture method. All these terms convey almost the same meaning.

Willson (2001) examined the effects of child-centered, teacher-directed, and scaffolded instruction on low-income, Latino pre-schoolers’ task performance, private speech and motivation (i.e., affect, on-task persistence, preference for challenge, independence, intrinsic motivation). Almost all children
showed post-test increases in task performance after the dyad session, although children in the child-centered group remained about the same. All children displayed less positive emotion after the dyad session due to increased boredom / frustration with the task. Scaffold children showed significantly more persistence than child-centered participants, but not more than teacher-directed children. Interestingly, the pattern of post-test means revealed that while the persistence of the scaffolded and teacher-directed children increased, that of the child-centered group decreased.

Adams (2001) studied the difference of computer-based instruction (CBI) and teacher-directed instruction (TDI) on students’ performance of the full golf swing. Results indicated that there was no statistically significant (<italic>& ge;0.05</italic>) difference in CBI instructional method and the TDI instructional method when performing the skill. In conclusion, CBI using the FOMS software can be used when teaching the full golf swing in an educational setting with an instructor present.

Reid (2000) examined the effects of computer-directed spelling instruction versus teacher-directed spelling instruction on the attention abilities and spelling performances of children with attention deficit (AD)/hyperactivity disorder (HD), using an A-B-A-B single subject design. Both treatment conditions with computer-directed instruction resulted in a statistically significant increase in engaged-time for 5 of the 6 students with AD/HD. However, there were mixed results on the frequency of off-task behaviour for students with AD/HD which does not appear to be affected by the treatment condition of computer-directed instruction.

1.2 OBJECTIVES

The purposes of instruction are as broad as life itself, but at any moment of time, a teacher has a delimited set of objectives. Objectives have an orienting and organizing effect, which dispose students to attend to and organize relevant information and, thus, facilitate performance on criterion-test terms constructed in accordance with the objectives (Merrill, 1974).
An instructional objective indicates instructional outcome expressed in terms of student learning. In general terms, it indicates those knowledge, skills, abilities and attitudes that the teacher expects the student to acquire as a result of instruction. In instructional designing, they provide a guideline for choosing subject matter content, for sequencing topics and for allocating teaching time and standards for measuring student achievement. In short, they serve as a criterion for evaluating the quality and efficiency of instruction.

According to Gagne and Briggs (1973), purposes for a course are defined and converted into operational terms by the process of defining performance objectives. These describe the planned outcomes of instruction, and they are the basis for evaluating the success of instruction in terms of its intended outcomes. Gagne and Briggs (1973) gave a 5 - component guide to the writing of performance objectives, viz. situation, learned capability, object, action, tools or other constraints. The specific goal or purpose for the instructional system should be derived from an analysis of environment of the system (Hannum & Briggs, 1982).

Bloom and his co-workers (1956) produced three “taxonomies” for cognitive, affective and psychomotor domains of behaviour. Each taxonomy arranged categories of objectives in order, from simple to complex, with the underlying principle that objectives at any one level build upon the one preceding to it. Bloom's (1956) work has focused attention on the distinction to be made between two broad categories of objectives in cognitive domain: ‘knowledge’ (Class 1) and intellectual abilities and skills (classes 2-6, including comprehension, application, analysis, synthesis and evaluation). Over the last three decades, Bloom’s taxonomy has prompted many teachers for the first time to seriously consider the variety of mental activity they might be assessing in their students.

Mager (1962) proposed the following standards for adequate and communicable instructional objectives:

a) Specification of the kind of behaviour, which is acceptable as evidence of successful instruction.

b) Statement of the conditions under which behaviour is to occur.
c) Specification of performance standards, usually specification of acceptable accuracy and speed.

Scriven (1967) makes, in effect, the same two-fold classification: knowledge and what he calls comprehension (to include analyzing, synthesizing, evaluating, and problem solving). The fine distinctions to be made among the higher processes will remain a matter for debate (Rowntree, 1977), because the processes somehow transform the remembered data to varying degrees and go beyond the information given. Rowntree further stressed that taxonomies must be regarded as suggestive, illuminative and stimulating rather than as comprehensive, prescriptive and indubitable. Not so much from considering whether such-and-such objective belongs to this category or that but from speculating as to what might be going on in the mind of the student as he tackles many questions and activities given as examples in the taxonomies.

Kropp and Stoker (1966) made an impressive attempt to examine the construct validity of the taxonomy. They designed four tests in two content areas: Science and Social Science. Each of the four tests contained six sub-tests, one for each of the major classes of the taxonomy. They concluded that, “there was a clear tendency for the empirical data to support the imputed hierarchical structure of the taxonomy”.

Veerkar (1980) conducted a study on the effect of integrated approach of teaching social studies on the performance of the pupils of fourth standard of the primary school in the state of Maharashtra. The findings of the study were: the treatment resulted in better achievement as far as total performance and performance related to knowledge, comprehension, skill and attitude objectives were concerned. Asencio (1984) used a meta-analytic technique to quantitatively synthesize the research from 111 studies reporting findings on the effects of behavioural objectives. It showed that behavioural objectives have a positive effect on student achievement.

Mehdi (1988) investigated instructional, developmental and social objectives of education at the secondary stage. He reported that (a) curricula in various subjects are far from balanced and were not conducive to attaining the three set of objectives; (b) teaching learning strategies should be geared to
attainment of intellectual, social and developmental objectives; these should be
made skill-oriented, and (c) evaluation techniques hinder the attainment of these
objectives.

Palanivelu (1989), conducted a study on objective-based teaching at
primary level. Here the objectives taken up were based on Bloom's taxonomy.
The teaching as well as testing material in science, based on the cognitive,
affective and psychomotor objectives were prepared. The performance of the
students taught by the objectives-based approach was better than those taught
by the teachers of the controlled group.

Sachan's (1991) study examined the validity of Bloom's taxonomy of
educational objectives in the cognitive domain in relation to teaching of science
and whether objective-based teaching results in better development of the
category system of cognitive domain. He conducted his study on about 500
students of 6-18 year age group. The major findings were that 4-tier hierarchy
comprising, K,C, A and E exists in place of the 6-tier hierarchy (K,C-A, SA, S and
E and that learning is cumulative, not sequential).

Mehra (1992) reported that the high intelligence group performed better
than the corresponding low intelligence group at knowledge level than at
comprehension level of objectives. On the whole, students attained more scores
at knowledge that at comprehension level of objectives. High intelligence group
attained more scores in authoritarian than in democratic school climate at both
the knowledge and comprehension levels of objectives. Low intelligence group
performed equally well in authoritarian as well as in democratic school climate at
both the knowledge and comprehension levels. Retention was found to be
equally effective for learning at knowledge as well as at the comprehension level
of objectives.

1.3 PEER TUTORING

In popular usage, the term "peer group" refers to a cohort of persons
close in age, most often the term usually indicates student cliques, but not gangs
(Hill, 1995). Tutoring is a method of teaching in which one student (or a small
group of students) receives personalized and individualized instruction (Medway, 1995).

In tutoring, the person providing remedial or supplemental instruction is called a tutor, while the student receiving the same is called a tutee. Tutoring most often supplements traditional classroom instruction which is typically conducted in large groups for those students who require remedial help and those who have difficulty in learning by conventional methods. Tutoring also is used for students with special needs of life circumstances, who are unable to participate in a regular instructional program. Tutoring is widely used with learners in primary and elementary school settings; however, tutoring also is practical in secondary education, higher education, adult education, and vocational education settings (Medway, 1995).

In most cases, tutoring refers to instruction not provided by a student’s regular teacher. The tutor may be a paid private instructor, a volunteer, a school aide, a parent or guardian, another student, a computer or other teaching machine. The tutor may or may not be similar to the learner in age, ability, background, or personal characteristics. The tutor may or may not be trained as an instructor; he or she may focus on one or several subject matter areas; and, like a large group instructor, the tutor may or may not reinforce, encourage, and counsel the student. Another usage of the word tutor is a college or university official who advises undergraduates, maintains disciplinary standards, and teaching assignments (for example, at many colleges and universities in the United Kingdom and Australia and at some United States Colleges) (Medway, 1995).

In this approach, a child trains another child in skills and subject matter that the first child has mastered. Because the first child has greater information or competence than the second child, the two do not begin the relationship with equal status; rather, the first child is considered an expert and the second child a relative novice. Moreover, the unequal status of the two children is often compounded by other factors as well. Most attempts at peer tutoring pair an older child with a younger child, or a bright child with an educationally
disadvantaged one. Peer tutoring, in fact, is then called “cross-age” tutoring, since the tutor is usually two or more years older than the tutee (Damon, 1995).

Peer tutoring occupies instructional ground somewhere between adult-child and true peer communication. Like adult-child instruction, peer tutoring is based upon a transmission-of-knowledge model. This model assumes that one party knows the answers and must communicate them to the other party. Knowledge is “passed down” from person to person in a linear fashion rather than co-constructed by persons who are both seeking answers. Unlike adult-child instruction, however, in peer tutoring the expert party is not very far removed from the novice party in authority or knowledge, nor has the expert any special claims to teaching competence. Such differences affect the nature of a discourse between tutor and tutee because they place the tutee in less of a passive role than does the adult-child instructional relation. Being closer in knowledge and status, the tutee in a peer relation feels freer to express opinions, ask questions, and risk untested solutions. The interaction between instructor and pupil is more balanced and more lively when the tutor is a peer (Damon and Phelps, 1989).

A theoretical grounding for peer tutoring can be found in L.S. Vygotsky’s idea of the Zone of Proximal Development. Vygotsky wrote that problem-solving in collaboration with more capable peer could enable children to enter into new areas of potential (Vygotsky, 1978). These new areas, which Vygotsky called the “leading edge” of children’s intellectual growth constitute the Zone of Proximal Development (ZPD); it is created when a child interacts with a more experienced mentor. Because the mentor guides the direction of the interaction in intellectually productive ways, the child’s intellectual performance during the interaction surpasses anything that the child has been able to do outside of the interaction. In the course of such experiences, the child retains the ability to produce these jointly produced intellectual performances autonomously. When this happens, achievement becomes part of the child’s actual capabilities rather than merely a potential skill that can be realized only through interaction. In this sense, the insights and competencies become internalized. Vygotsky argues that it is not only information that is internalized, but also fundamental cognitive
processes that are implicit in the communications. Accordingly, both parties of the communication stand to benefit. The tutee profits from the very acts of questioning, challenging and providing feedback to the tutor. The tutor profits from the act of reformulating knowledge for transmittal to the tutee, from answering the tutee's questions and from responding to the tutee's challenges. This is what is meant by the old axiom that one never really knows a subject until one tries to teach it (Damon, 1995).

Of the three types of peer learning, it was peer tutoring that first made inroads into actual school settings. In the 1970s, a number of educators experimented with peer tutoring as an alternative form of instruction. Generally they found it to be effective in stimulating the educational progress of both tutor and tutee (Gartner et al., 1971).

From these and subsequent research programs, the following picture has emerged. Peer tutoring, when carried out over a substantial period of time with carefully trained and supervised tutors, is educationally valuable for its participants. It is also surprisingly cost-effective when compared with other instructional techniques. When done well, it can aid children's acquisition of both verbal and quantitative skills as well as substantive curriculum topics such as history, physics and social studies. Finally, peer tutoring can also yield personal benefits for both tutor and tutee. Children's self-esteem, educational motivation, school adjustment and altruistic inclinations all improve in the course of peer tutoring (Damon, 1995).

Peer tutoring is the system of instruction in which learners help each other and learn by teaching. In essence, peer tutoring is extremely simple to arrange. However, peer tutoring can and should be more systematically planned than it is at present. Research shows that not only can peer tutoring make learning more efficient and pleasurable for those who are taught (tutees), but it can also increase significantly the learning of the tutors who help professional teachers (Goodlad & Hirst, 1989).

Tutoring schemes, known variously as Peer Tutoring, Cross-Age Tutoring, Youth Tutoring Youth, and Each one Teach one, have used students to teach students, students to teach children, non-professional adults to teach.
adults and children, and children to teach children. For the sake of simplicity, the common phrase peer tutoring is used in this thesis – "peer" being defined as someone belonging to the same group of society when membership is defined by status. In this case, the status is that of not being a professional. In every case of peer tutoring, a professional teacher organizes the activity of the non-professionals (tutors) as they minister to the needs of the ultimate beneficiaries of the process (tutees) (Goodlad & Hirst, 1989).

In essence, peer tutoring is extremely simple to arrange. Any teacher can readily arrange for abler pupils to help less able-ones within a single class. However, peer tutoring can, and should be used more systematically than that it is used at present. Research suggests that tutoring may have more possibilities than was at first realized. Not only can it make learning more efficient and pleasurable for those who are taught (tutees) but it can also increase significantly the learning of the tutors. Peer tutoring could, therefore, usefully become not only a technique to be used by professional teachers to multiply their effects, but also a method by which those who act as tutors learn information and skills. More importantly, it can be used as a vehicle for reflection about the cultural and structural significance of the central discipline being studied or, indeed, about the nature and purpose of education itself.

1.4 PEER TUTORING – A HISTORICAL PERSPECTIVE

Since the early 1970s, many reports and studies have described programs in which students tutor other students (Allen, 1976; Green-Wood et al., 1988). This practice is known as "peer tutoring" when students and tutors are similar in age. The term "cross-age tutoring" is used when students and tutors differ in age.

Paolitto (1976) traced the historical roots of cross-age tutoring back to the first century A.D. when Quintilian noted the practice of having younger students taught by older ones in his Institutio Oratoria. Cross-age tutoring was used on a limited basis in Germany and Spain in the sixteenth century.

Organized and widespread use of cross-age tutoring is generally credited to Andrew Bell, a Scotsman, who in the late eighteenth century established a
school for orphans of British soldiers and Indian mothers in Madras, India. Bell modified the ancient Hindu tutoring system and in 1797 reported on the successful application of individual and group tutoring for instruction and discipline.

Bell’s methods were adopted by the English educator Joseph Lancaster. It came to be called as the Bell-Lancaster system, in which professional teachers instructed older students, who in turn instructed younger students, with younger students teaching still younger ones. Although variations of this system spread throughout Europe in the early 1800’s its popularity was short-lived due to the growing recognition of teaching as requiring special talents and professional training. Nevertheless, in the United States, peer and cross-age tutoring were practised in one room school-houses of the colonial period and in rural schools throughout much of the nineteenth century.

Renewed interest in peer tutoring in the United States began in the early 1960s because of shortages of teaching personnel and the belief that some children might show more interest in learning if given the opportunity to work with another student rather than an adult. Among the advantages attributed to peer teachers are the tutor’s similarity in culture and language to the tutee, the tutor’s motivation, and the tutor’s empathy for the learner’s situation (Medway, 1995).

One of the first and most extensive cross-age tutoring programs was the high school Home Work Helpers Program started in 1962-63 in New York City. In this program approximately 1,000, 16 to 18 year-old-students served as paid tutors to approximately 6,000, 14 to 16 year-old-students from disadvantaged background with reading problems.

A second major project designed to improve the reading skills of children from impoverished, inner city homes was the Youth Tutoring Program. This project was originated by Mary Kohler who operated an independent agency in New York City called the National Commission on Resources for Youth. Youth Tutoring Youth programs were started in several large cities including Washington, DC and Chicago, and more than 3,500 people were trained in tutoring techniques (Gartner et al., 1971).
A third noteworthy program was the Cross-age Tutoring Project developed by Lippitt and Lippitt in Michigan and California which was designed to improve the achievement and self-esteem of elementary school students. Each of these projects is described by Allen (1976).

Although tutoring practices vary widely across settings, much research evidence supports the effectiveness of peer and cross-age tutoring as teaching methods. One of the first studies was the 1987 evaluation of the Homework Helper program. Students who received reading tutoring for four hours a week for five months gained more in reading comprehension than did a group of non-tutored children. The study also found that tutors improved in reading even more than did tutored students. This was one of the first studies to show the benefits of tutoring for the tutor.

During the 1970s, tutoring programs were instituted in schools around the world, including Great Britain, Australia, Hong Kong, Germany and Israel (Quicke, 1986; Sharpley et al., 1983). For example, in just one year, more than 6,000 children participated in Israel’s Perach Project, a cross-age tutoring program in which college students tutored disadvantaged children (Eisenberg et al., 1985).

Several research reviews, such as one by Cohen et al. (1982), have found many benefits for tutors and tutees across a wide variety of academic and social measures. Tutoring improves school achievement, self-concept and attitudes towards school, and students gain more by being tutored than they do through lectures and large discussion. Studies have also documented the advantages of tutoring for pre-school children as well as children with learning and behaviour problems.

During the 1970s and 1980s researchers became interested in the factors that serve to increase the likelihood that tutoring will be effective (Medway, 1991). Most research evidence suggests that cross-age tutoring is superior to peer tutoring. An excellent study by DePaulo et al. (1989), showed that benefits of tutoring are particularly impressive when tutors are older than tutees, when tutors and tutees work in a cooperative context, and when both tutors and tutees are high achievers. This last finding clearly shows the advantages of tutoring for
competent students as well as those who require more than large group instruction can provide.

Pioneered in the late 18th and early 19th centuries by Andrew Bell and Joseph Lancaster, peer tutoring has been revived, particularly in the United States of America and in developing countries, to meet situations of crisis. In the United States alone, schools in 41 out of 50 states were found to be using tutoring (Smith, 1983), and many after-school study centers have provided extra tuition to those who need it. In the United Kingdom, many teachers have made informal arrangements, in and out of class, for older and more advanced pupils to help younger or more backward ones. In recent years, very considerable use has come to be made of peer-tutoring – for example, in paired – reading projects (Goodlad & Hirst, 1989).

1.5 BENEFITS TO TUTORS AND TUTEES

Until now, tutoring has been seen primarily as therapy – as a means of helping school-children who are troublesome or who are backward in their studies. Tutoring has been thought of as something extra, something special, something unusual. However, the urge to tell people things, to explain, and to instruct is universal; and, as Comerius observed, ‘Qui docet, discit’ – ‘he who teaches, learns’. Learning by teaching can be part of everyone’s experience in education – and helping professional teachers can be an immensely enjoyable and rewarding activity for people of any age from infancy to retirement inclusive (Goodlad & Hirst, 1989).

Tutor should benefit from peer tutoring by:

- developing their sense of personal adequacy (role-theory);
- finding a meaningful use of the subject matter of their studies (Gestalt Theory);
- reinforcing their knowledge of fundamentals (Gestalt Theory);
- experiencing being productive (role theory);
- developing insight into the teaching /learning process (Gestalt Theory) (Goodlad and Hirst, 1989).

Tutees should benefit from being tutored by:
- receiving individualized instruction (behaviourist theory);
- receiving more teaching (behaviourist theory);
- responding to their peers (role theory & Gestalt Theory);
- receiving companionship from tutors (Gestalt Theory) (Goodlad and Hirst, 1989).

Several writers on peer tutoring have catalogued the benefits sought from the process. Potential benefits to tutors and tutees can be classified as described below:

(a) Benefits to Tutors

1. Tutors develop their sense of personal adequacy (role theory)

   Qualitative accounts of peer tutoring schemes frequently point out the serious and responsible way in which even previously troublesome children go about their tutoring duties (Maher, 1982; Scruggs et al., 1985; Shisler et al., 1986). Role theory would suggest that, by requiring tutors to live up to their responsibilities, peer tutoring is taken to develop an enhanced feeling of self-esteem. Many children experience nothing but failure in the school system, being, perhaps, backward in academic studies and inadequate in skills (such as sports or fighting) which their peers may value. Even children who are backward in academic terms are competent in skills which more junior pupils are struggling to acquire. Through tutoring, the older pupils can experience the respect and admiration of younger pupils and, provided that the tutoring tasks are properly planned, can enjoy the experience of success in social relationships.

2. Tutors find a meaningful use of the subject matter of their studies (Gestalt Theory)

   A problem at all levels of education is that students often do not see the significance of what they are studying because they have no immediate use for it. University students, no less than school pupils, may assimilate ideas and information simply to pass examinations – an object of limited appeal. Peer tutoring gives tutors a chance to make direct use of the knowledge they already possess and may, consequently, inspire them to seek more of it.
3. **Tutors reinforce their knowledge of fundamentals (Gestalt Theory)**

   Peer tutoring offers the opportunity to review and restructure the knowledge they possess as they re-present it to students younger than themselves. Peer tutoring can give anyone who acts in a tutorial role this rewarding revelation. Peer tutoring can also reinforce learning by requiring tutors to recapitulate elementary subject matter. Indeed, peer tutoring has given older children a face saving way of studying material several years below their expected achievement level.

4. **Tutors in the adult role and with the status of teacher, experience being part of productive society (Role Theory)**

   Modern educational practice keeps young people in school well past the point of physical maturity. A common consequence is that teenagers react against the feeling of dependence on adult society and envy those with adult status and those who are part of the productive society. Peer tutoring offers those who act as tutors the experience of being productive, a chance to develop part of themselves which might otherwise atrophy.

5. **Tutors develop insight into the teaching/learning process and can co-operate better with their own teachers (Gestalt Theory and Role Theory)**

   Peer tutoring offers tutors the opportunity to reflect about the nature and purpose of educational institutions and, thereby, perhaps to articulate their points of agreement and disagreement with teachers. Gestalt Theory maintains that, having perceived the overall purpose and shape of an educative process, tutors will be better to 'locate' their own particular learning activities within it. Role theory stresses the 'cultural migration' involved in peer tutoring, in which the taught become the teachers, will give the tutors insight into what their teachers are trying to do. It is, however, likely that, having experienced the role of teachers, students will be better able to sympathize with and discuss rationally their teacher's aims.
(b) Benefits to tutees

1. Tutees receive individualized instruction (Behaviourist Theory)

   Behaviourist theory holds that learning increases if every response a learner makes receives instant feedback, and that learning is reinforced if correct responses are systematically rewarded. By giving every learner his or her own teacher, peer tutoring offers all the benefits of individualized instruction, whether or not programmed instructional materials are used.

2. Tutees receive more teaching (Behaviourist Theory)

   Just as peer tutoring individualizes instruction, so it provides more of that instruction. Because peer tutoring is designed to multiply the effect of the teacher, it can hugely increase the amount of personal instruction going on in a school or college. A single teacher coping with up to 30 pupils cannot hope to give much time to any individual pupil. Peer tutoring increases the number of personal contacts a pupil can have.

3. Tutees may respond better to their peers than to their teachers (Role Theory, Gestalt Theory)

   Communication in educational institutions can be impeded by cultural differences between teachers and learners. Feldman and Allen (in Allen, 1976) found that children are more sensitive than adult teachers to non-verbal cues offered by other children to show that they do not understand something. The child tutor may be better equipped than the adult teacher both to appreciate what the tutee is likely to have difficulty in understanding and to recognize when the tutee actually does not understand.

   Gestalt Theory, too, suggests that children will more readily perceive relevant structures or patterns which make knowledge meaningful if they are invited to do so by people close to themselves in age and cultural outlook.

4. Tutees can receive companionship from tutors (Gestalt Theory)

   In many schools, it is the practice for new entrants to be ‘looked’ after by an older pupil who acts as a companion and guide during the first weeks when
school customs and rules may be quite bewildering. Gestalt Theory suggests that learning will be improved if the pattern or field, into which individual ideas and experiences must be placed, is simply, quickly and painlessly communicated. Peer tutoring, by putting tutees in contact with tutors close to them in age, increase the likelihood of this happening (Goodlad and Hirst, 1989).

Effects on tutors of taking part in tutoring

a) Cognitive gains

School children taking part in tutoring as tutors have much to gain in doing so. Cloward (1967) showed how 16-year-olds could improve their reading by tutoring. Similar results have been obtained by, among others, Erickson and Cromack (1972); Hassinger and Via (1969); Kelly (1972); Kenemuch (1974); Mainiero et al. (1971); Morgan and Toy (1970); and Strodtbeck and Granick (1972). Allen and Feldman (1973) showed that ten-year-old children learned better by tutoring in science-related topics than by studying alone.

b) Affective gains

Affective gains have been more difficult to measure systematically than have cognitive ones. Improved self-concept has been particularly difficult to demonstrate. Reviewing literature which reports that low self-concept and under achievement are related, he set out to improve both self-concept and scholastic success by having subjects tutor and participate in group counselling. The result of the study demonstrated that under-achievers have a lower self-concept and attitude towards school than do other pupils. Dobbs (1974) reported an improvement in attitude-to-school on the part of 13-year-olds who acted as tutors to elementary school pupils.

Effects on tutees of being tutored

a) Cognitive gains

Many studies have shown how reading skills of tutees can be significantly improved by contact with non-professional tutors. For example, Erickson and Cromack (1972) showed how eight-year-olds improved when taught by 12-year-olds; Hassinger and Via (1969) showed that teenagers and their nine, ten and
eleven-year-old tutees both improved their reading skills in a six-week experiment; likewise Mainiero et al. (1971) showed that the reading skills of 13-years-old tutors and their nine, ten and eleven-year-old tutees improved in a similar scheme.

b) Affective gains

With tutees as with tutors, it has been difficult to show by psychometric research the way in which self-concept improves. However, Mainiero et al. (1971) showed that the self-concept of nine, ten and eleven-year-olds improved when they were taught by 13-year-olds. Strodbeck and Granick (1972) showed that the self-concept of the tutees in the Youth Tutoring Youth Program also improved. Scruggs & Osguthorpe (1986), studying tutoring interventions within special education settings, found, to their surprise, that the chief attitudinal gains were to the tutees. They suggest that this may be because the tutees feel more positive about themselves because of the attention they received from the tutors.

1.6 FACTORS WHICH ARE IMPORTANT IN MAKING PEER TUTORING EFFECTIVE

Feldman et al. (1976) have given a comprehensive critical review of research concerning factors which seem important in making tutoring effective.

a) Pairing of tutors and tutees

Cloward (1967) found no significant effects of different sex pairings, nor did Mevarech (1985). Cicirelli (1972), studying the effect of sibling relationship on concept learning of young children taught by child-teachers, found that irrespective of the sex of the younger child; (a) sisters are more effective than brothers when teaching younger siblings; (b) sisters are more effective in teaching younger siblings than girls are in teaching younger unrelated children; (c) boys tend to be more effective in teaching unrelated younger children than in teaching younger siblings; and (d) boys and girls do not differ in effectiveness as teachers of unrelated younger children.

Topping and Whiteley (1988), in a study of Paired Reading involving tutors and tutees of the same age, found that male-male tutorial combinations
did particularly well all round. Female combinations were good for the tutees but poor for the tutors. Mixed-sex combinations were good for the tutors but poor for the tutees.

b) Age and ability differences

The intellectual gains of tutors are, for obvious reasons, likely to be greatest when they tutor children as near to their own achievement level as possible. The tutors benefit by systematically reviewing, for purposes of tutoring, subjects which they have recently studied.

Common sense would suggest that tutees would benefit most from having tutors somewhat advanced in age and achievement, who could bring a wider range of knowledge and experience to bear on the tutoring. Some research by Linton (1972) supports this notion. Linton studied the effects of grade-displacement between tutors and students tutored, and examined the effects of 13-year-old pupils being tutored by respectively other 13-year-old pupils, 15 year-old pupils and 17-year-old pupils. His findings indicate that 17-year-old tutors were more effective for helping 13-year-old tutees who were making Ds and Fs in eighth-grade mathematics than 13-year-old tutors. However, the gains were evident whoever did the tutoring. In like manner, Sharpley et al. (1983), in a study of peer tutoring in mathematics, found that the achievement level of tutors had negligible effects on the general mathematics gains of the tutees. The matter is by no means clear-cut.

c) Numbers and duration of tutoring sessions

Cloward (1967) suggests that tutoring sessions four hours a week for 26 weeks are more effective than two hours per week of tutoring for the same number of weeks. Tutoring schemes seem to have been effective over periods from two weeks to two years. There is some evidence that the longer the tutoring can go on (number of weeks in the year) the more visible the result. However, in a study designed to address this specific issue, Fresko and Eisenberg (1985) found that there did not appear to be an advantage of two years of tutoring over one year. Greatest gains of achievement tended to occur during the first year of tutoring. Osguthorpe (1985) makes a similar observation suggesting that an
effective tutoring program will show positive results with as little as ten total hours of tutor-tutee contact.

d) **Number of tutees per tutor**

Klosterman (1970) found that one-to-a-group was as effective as one-to-one. Anslow *et al.* (1977) confirm this. Similarly, Shaver and Nuhn (1968) found that one-to-three tutoring was as effective as one-to-one. These findings suggest that monitorial instruction is likely to be as effective as the more expensive pairing of tutors and tutees. However, the technical efficiency of these arrangements must be balanced against the evident satisfaction both tutors and tutees get from developing personal relationships with each other.

e) **Training of tutors**

Conrad (1975) found that the tutees of trained tutors did significantly better than the tutees of untrained tutors. What is at issue is not the presence or absence of full-scale teacher-training. Shaver and Nuhn (1968) showed that training of this complexity had little influence on the effectiveness of tutoring. Rather, it seems highly desirable that tutors should be given some elementary instruction in how to proceed. Niedermeyer (1970) made the not unsurprising finding that behaviours of trained and untrained tutors differed with respect to basic instructional principles. Niedermeyer constructed an observation-scale to assess instructional behaviours related to the objectives of a structured tutor-training program. Briefly, these behaviours were as follows:

i) tutor engages pupil in non-instructional, friendly conservation;

ii) tutor verbally confirms correct pupil responses;

iii) tutor praises the pupil;

iv) tutor tells or shows the pupil the correct response when the pupil is incorrect;

v) tutor, after displaying behaviour as in (iv) then elicits correct response from pupil before going on;

vi) tutor following non-responses to his initial question or direction, repeats it in different words; and

vii) tutor avoids attempting to elicit correct response by prompting.
In his study, he observed that tutor who had been trained in these techniques used them, whereas those who had not been trained in them did not use them.

**f) Structured versus unstructured tutoring**

There is a good deal of evidence that the interests of tutees are best served if the tutoring is structured. In structured tutoring, the instructional materials are closely-programmed so that the interaction between tutor and tutees is focused on specific, detailed tasks. Little discretion may be left to the tutor about how to present material to the tutee. Several studies have specifically compared structured and unstructured tutoring in terms of the achievement of tutees. For example – Elleson *et al.* (1968) carried out a field test of programmed and directed tutoring. They found that programmed tutoring was more effective than directed tutoring (i.e., structured more effective than unstructured). They commented on the satisfaction of all participants, supervisors, tutors, and tutees, in unstructured schemes but say, rather tartly, ‘but the favourable impression of directed tutoring as a teaching procedure was not supported by evidence that it improved reading achievement’.

**1.7 SPECIFIC BENEFITS FROM DIFFERENT TYPES OF PEER TUTORING**

The teacher planning to use peer tutoring will need to balance the interests of tutors and tutees. Klaus (1973, 1975) has done signal service to understanding of peer tutoring by highlighting various models. The following classification owes much to that of Klaus, though differing from it in several aspects.

**a) Same-age peer tutoring: interactive pairs.**

Perhaps the simplest form of tutoring involves the arrangements of pupils in a classroom into interacting pairs. Many teachers already organize classes into small groups for various purposes, for example, to share scientific apparatus which may be in short supply. To turn this type of arrangement into tutoring requires only that teachers provide pupils with tasks of mutual instruction. Able pupils can be paired with less able ones – an arrangement which can help less
able pupils to keep up with the class and which gives the more able pupils the chance to reinforce their knowledge as they go along. Again, pupils can be asked to read each other’s written work.

Peer tutoring of this sort does not, of course, draw on the benefits of extra knowledge which differences in age and achievement level may offer. It is, however, a useful way for the teacher to multiply his or her effect.

b) The Monitor System

Variations of the old Lancaster and Bell system offer many advantages. As Klaus (1973) has pointed out, the use of older students or pupil’s as monitors can counteract the frustration associated with unreasonably large classes. The teacher can divide the class into convenient – sized groups and assign monitors to lead the groups in drills or to supervise written exercises. Schemes of monitorial instruction become increasingly attractive as schools move over to mixed ability classes.

For many years, monitors have been used in schools to help the teaching staff keep discipline-peer tutoring extends their roles to helping in instruction. The danger, to which Klaus (1973) draws attention, is that teachers will under-use monitors, neglecting to give them teaching tasks for which they are quite fitted even without teacher training.

c) Unstructured peer tutoring

In unstructured peer-tutoring, older students help younger ones on a one-to-one or one-to-a-group basis with considerable freedom to choose the way in which they present the material to the younger children. The advocates of this method, such as Youth Tutoring Youth, emphasize the benefit to the tutors in having to organize their ideas in order to present them. Teachers planning peer tutoring schemes will need to strike a balance between the advantages to tutees of having well-informed tutors, and the manifold advantages to pupils who act as tutors of having tutees near to themselves in age and experience.

d) Structured peer tutoring

Structured peer tutoring involves the use of closely-controlled procedures, sometimes even programmed texts. Those who advocate it stress the benefit to
the tutees of the procedures. Tutors with even very limited education can be effectively trained to administer highly structured material.

By minutely detailed instructions, the tutors guide the tutees in their handling of the material. Characteristically, the tutors feed their tutees with it in small steps, reinforcing correct responses with praise and reinforcing material without comment after incorrect responses have been given. However, care is needed not to exploit tutors in structured schemes and to find ways in which the tutors can benefit from their experience. Teachers may more readily accept structured peer tutoring because the content of the teaching is more closely in their control.

e) **Semi-structured peer tutoring**

Semi-structured peer tutoring tries to combine the advantages of unstructured peer tutoring with those of structured peer tutoring. In semi-structured peer tutoring, the tutors guide their tutees through a carefully-planned syllabus, but are free to amplify it and modify it in the light of their own interests and skills and those they discover in their tutees. So, the tutors must have some part in the planning of the lessons and in discussing the overall teaching strategy.

f) **Cross-age tutoring**

Many schools have adopted a variety of cross-age tutoring programs, which train adolescents as tutors for younger and sometimes under-achieving students. Such programs are considered innovative because they transfer teaching responsibilities to older students, and also because the interference with the age segregation of students in school cross-age tutoring is claimed to benefit both the tutors and tutees, but the evidence is often based on anecdotal reports or on inconclusive research, due to weaknesses in measurement and design. Studies in the area employing rigorous methodology were mainly concerned with the learning success of involved students or with the causal attributes for performance made by tutors and tutees. The assessment of the effects of cross-age tutoring on the social and psychological attributes of either tutors or tutees has been largely neglected.
Allen (1976) has suggested examining the effects of tutoring on tutors' attributes according to role-taking theory. He claims that enacting the role of tutor may produce behavioral and cognitive changes which, in a manner similar to any other role enactment, are congruent with role expectations.

Cross-age tutors are expected, in contrast to other adolescent in the age-segregated school system, to construct a meaningful interaction with younger children. They must establish an empathic understanding of the tutees' problems in order to help them effectively. Back in their own classroom, the tutors may also better understand their teachers by cognitively placing themselves in their position. The experience of tutoring is, therefore, expected, first and foremost, to increase the tutors' empathy, or ability to understand other people through identification with their feelings and viewpoints (Charkuff, 1969).

On a more general level, the role of tutor is characterized by volunteering help to other youngsters without seeking extrinsic benefits in reciprocation. Adolescents are more typically help-recipients than help-extenders, and they usually do not experience help giving and the psychological rewards involved in it on a long-term basis. The role of tutor provides the opportunity to experience the intrinsic psychological benefits of giving help to others. Realization of these psychological dividends may enhance in general the tutors' altruistic motivation, which is defined as the motivation to volunteer help for intrinsic reasons (Macaulay and Berkowistz, 1970).

Role expectations and role-enhancement may increase the tutors' self-esteem. Tutors are expected to show a certain extent of self-confidence in their relations with the tutees. Comparing their competencies and abilities with those of the tutees may further enhance their self-confidence. In addition, they are usually respected and sometimes admired by the tutees. They may also gain respect from others, such as friends, teachers, parents and the tutees family, because of the teaching responsibilities they assume. The tutors' self-esteem is, therefore, expected to strengthen as a consequence of self-reinforcement and gain of respect from others (Yoge and Ronen, 1982).
1.8 IMPORTANCE OF PEER TUTORING

There are four general points which suggest the importance for peer tutoring (Goodlad and Hirst, 1989).

a) Reconciling traditional and progressive approaches to education

Education in an end as well as means: it is an experience to be savoured as well as preparation for the future. To conceive of education in too narrowly instrumental terms is to diminish drastically its human value and importance. Education is primarily a means to some other and (notably, work) or that education is an end in itself. Manifestly it is both, the form (the setting, the system of human transactions) through which education takes place should indeed be as pleasant and relaxed as possible; but this does not mean abandoning structure in the content.

Some strategy is needed which can offer the merits of intellectual structure (for this is above all what professional educators can contribute to people's acquisition of knowledge) and a socially pleasurable form of transmission of that structure. Tutoring can diffuse the social predominance of the teacher while preserving and enhancing the teacher's professional responsibility for intellectual structure.

Peer tutoring can also transform learning from a private to social activity. By involving learners in responsibility for their own, and more importantly, other people's education, it increases social interaction within an educational institution and between different types of educational institutions, making the process of learning, as well as its end product, more rewarding.

To perceive the fundamental purpose of a social institution, and thereby perhaps identify with it, the individual must be given an opportunity to share in the process by which the institution defines itself. In an educational institution, peer tutoring is attractive in drawing the maximum possible number of people into the process of sharing knowledge.

b) Moral education through the exercise of responsibility

Peer tutoring gives those who act as tutor the opportunity to learn how to care for other people. Moral education can all too easily become teaching about
responsibility with the learner ever having the opportunity to exercise any responsibility. A widely-reported feature of peer tutoring is the immense personal satisfaction enjoyed by tutors, who feel that they are needed. The experience of being wanted can contribute to personal growth. Peer tutoring is, therefore, attractive as a relatively simple way in which learners of practically any age and academic competence can be given responsibility.

c) Flexibility of education at researchable cost

At present, one person in five of the entire United Kingdom population is engaged in full-time education as a teacher or as a learner. A similar proportion of the population is involved in full-time education in most Western countries. Education, like all labour-intensive industries involving personal care and resulting in no immediate economic benefit, is sometimes perceived as an economic burden.

Currently, teachers in many countries are having to defend their right to a fair share of economic expenditure. Even if education comes to command a great share of public spending, it will never be possible to achieve a ratio of teachers to pupils large enough to maintain both a wide choice of school subjects and the sort of detailed attention to pupils which backward pupils need in order to survive, and which bright pupils need for stimulus.

Again, in schools which have abolished streaming, mixed ability classes positively require that individual attention be given to pupils of differing abilities and attainments. Some strategy is needed which permits individualized instruction at no extra cost. Even if teacher trade unions succeeded in achieving a national average teacher/pupil ratio of, say, 1:10 (in present conditions a wild and fantastic dream!) it will be necessary to provide in such classes for children moving at different rates. Peer tutoring offers a possible solution.

d) Easing the strain on teachers

In many schools, particularly those dealing with the 12 to 16-year-old age group, teachers lead lives of quiet desperation. Peer tutoring can ease the strain of dealing with large and troublesome classes.
Opinions of pupils about peer tutoring

Far and away the most popular feature of the peer tutoring in each year has been the help the pupils received, for example:

- You can ask them (tutors) questions which means you don’t have to wait so long to ask questions and you get attended to more quickly’.
- ‘You get more work done due to extra help’.
- ‘We don’t have to be calling our teacher all the time. There was always a tutor on our table to help’.
- ‘They were very helpful and I got through more work than with only one teacher teaching the whole class’.
- ‘They helped us a lot when we had our projects. They were very polite and helpful and I would like them to come next year’.
- ‘We had more attention and the work was explained in a simple way. This was when we were split into little groups’.
- ‘Individual attention: there were enough students for six pupils to one student. It was a refreshing change to have someone different to talk to. They spoke to you and treated you like adults’. (Goodlad & Hirst, 1989)

The extra attention to pupils and the rapid reinforcement of their learning is one of the principal justifications of tutoring. Accordingly, it is gratifying to note that this has consistently been the most appreciated feature of the scheme.

Secondly, the informality, friendliness, and kindness of the students are regularly mentioned by the pupils. For example:

→ ‘Some of the tutors are nice and polite and helpful’.
→ ‘Helpful and nice’.
→ ‘They were very friendly, and I think that when they were in the class they relaxed the atmosphere considerably. Also, we were on a first name basis. The formality of them being in the class was taken away and they were more like pupils than teachers, it seemed to me’.
→ ‘They were happy tutors and nice to have around’.

Other factors were liked very greatly and have included the following:

→ ‘They made sure that we understood what he had to do’.
→ ‘They give you work’.

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‘You don’t have the same teachers all the time’. 
‘To know them and show them what I can do?’

What the tutors liked best.
Most frequently cited has been the sheer satisfaction of tutoring. For example:

- ‘Satisfaction when a pupil understood a point I was trying to make’.
- ‘The response of children who learned-especially their interest when stimulated by something we told them’.
- ‘Tremendous satisfaction when a lesson went well and the pupils had responded with interest and enthusiasm’.

Similar was the pleasure of explaining things, for example:
- ‘Showing some experiments to the pupils’.

These types of satisfaction were similar to that of being appreciated by the pupils, for example:
- ‘That some of the pupils genuinely seemed to appreciate having tutors there and seemed to show increasing interest in the experiments’.
- ‘Being able to build up a relationship with some of the tutees. Also, I was very pleased to see that different ethnic groups mixed freely without friction.

What the tutors disliked:
Most frequently cited each year has been the lack of interest of some of the pupils in the subjects they were studying. A typical dislike was:

- ‘Meeting with a “brick wall” when trying to explain certain things – particularly with the brightest children who simply were not interested but totally capable of learning’.

The second most frequently cited dislike has been lack of discipline and noise. For example:

- ‘Lack of discipline. This distracts and hinders those who would like to work’.
- ‘Finding myself in a class in uproar with the teacher unable to control it’.

(Goodlad & Hirst, 1989)
1.9 CLASSROOM LEARNING ENVIRONMENT

A classroom is a unique face to face group marked by interpersonal relationships among its members. These interpersonal relationships essentially include teacher-student relationship and peer relationship. The general atmosphere within which the academic activities take place is influenced by these relationships.

Families and classrooms are two of the most significant learning environments that influence students’ school environment. The environment, climate, atmosphere, tone, ethos, or ambience of a classroom is believed to exert a powerful influence on student behaviour, attitudes and achievement. Although classroom environment is a somewhat subtle concept, remarkable progress has been made over the last quarter of the twentieth century in its conceptualizations and assessment, which has led to an increasing understanding of its determinants and effects.

According to Good (1973), classroom climate/environment includes heat, light, seating, individual difference among the members of the group, teacher’s personality and teacher-pupil relationship. In general, it may be said that the classroom climate/environment could include the physical, social and psychological dimensions. Classroom environment plays an important role in the motivation of learners and also in boosting the morale of teachers. Teacher-pupil interaction, teacher’s philosophy and his perception of his role are important factors affecting the classroom environment.

In looking broadly at different kinds of learning environments, there are three observable general functions that support different environments:

a) participating in discourse;
b) participating in activities;
c) presenting examples of work to be evaluated.

Environments themselves may be divided into six kinds, two relevant to each general function:
a) i) **Communication environment**, where learners participate in discourse by actively constructing goals, problems, meaning, information and criteria of success;

   ii) **Information transmission environment**, where learners participate in discourse by receiving information;

b) i) **Problem-solving environment**, where learners work on projects and problems;

   ii) **Training environments**, where learners practice exercise to improve specific skills and knowledge;

c) i) **Evaluate performance environments**, where learners perform for an audience;

   ii) **Recitation and testing environments**, where learners demonstrate their ability to work problems or answer questions (Hill, 1995).

   Most teaching and learning environments contain elements of all six types. The most effective learning environments combine the advantages of each type.

   Participation in discourse, participation in activities, and presentation of work for evaluation are all essential to learning. Traditional schooling has emphasized reading and lecture, problem-solving, drill and practice, homework, and recitation and testing as learning environments. In the shift from traditional learning environments to more constructivist learning environment, there has been a parallel shift to incorporate some of the characteristics of work environments; such as shared cognition, tool manipulation, and contextualized reasoning (Resnick, 1987).

   Psychological perceptions of classroom environments have important influences on student achievement, performance, and self-concept as well as on other valuable educational outcomes. Climate measures are practical, inexpensive, and they predict learning gains more accurately than do so-called objective variables such as students' social class, teacher behaviours and other characteristics, school and class size and educational expenditure.

   Positive classroom environments are generally assumed to be educationally desirable ends in their own right. Moreover, comprehensive
evidence from past research establishes that classroom environments have potent influence on how well students achieve a range of desired educational outcomes. Consequently, educators need not feel that they must choose between striving to achieve constructive classroom environment and attempting to enhance student achievement of cognitive and affective aims. Rather, constructive educational climates can be viewed both as means to valuable ends and as worthy ends in themselves.

Providing an effective learning environment includes strategies that teacher use to create a positive, productive classroom environment. Often called classroom management, strategies for providing effective classroom environments includes preventing and responding to misbehaviour but, more important, using class time well, creating an environment that is conducive to interest and inquiry and permitting the use of activities that engage students' minds and imaginations. Students who are participating in well structured activities that engage their interest, who are highly motivated to learn and who are working on tasks that are both challenging and within their capabilities rarely pose any serious management problem (Slavin, 1997).

There has been a shift in perspective in educational psychology from teaching to learning. The change is subtle and reflects a move away from an information transmission view to a constructivist view of education. Another shift in perspective involves recognizing that learning and work are not separate activities. In fact, learning takes place both in and out of school, and students' activity in school is a form of work (Collins, Greeno and Resnick, 1995).

The importance of classroom learning environment has been increasingly recognized over the past 20 years. Considerable progress has been made in the conceptualization, assessment and investigation of the important but subtle concept of learning environment (Fraser, 1986, 1995, 1998; Fraser and Walberg, 1991; Wubbles and Levy, 1993). In the past, the most common means of measuring, learning environment has led to insights into the learning environment through the eyes of the participants, rather than through the eyes of an external observer (Aldridge, Fraser and Huang, 1999).
Research studies involving the use of learning environment identified how the classroom environment varies with such factors as teacher personality, class size, grade level, subject matter, the nature of the school-level environment, and the type of school (Fraser, 1995).

1.10 INTELLIGENCE

The dimension of individual differences that has received maximum attention of psychologists is intelligence or ability. Terman (1916) defined intelligence as the ability to think in abstract terms. Freeman (1962) gave a comprehensive three-fold definition of intelligence:
- The adaptation of adjustment of individual to his environment.
- The ability to learn.
- The ability to carry out abstract thinking.

Intelligence or general ability has been of particular interest to educators because of its strong relationship to classroom learning and school achievement (Sternberg & Kaye, 1982). Typically, intelligence is defined as a person's score on the intelligence test. Guilford (1984) defined intelligence as “a systematic collection of abilities or functions for processing different kinds of information in various ways”.

Since the introduction of intelligence test by Binet and Simon (1916) enormous research has been conducted to establish empirically the relevance of intellectual abilities for explaining variance in academic performance. Earlier studies of Hollingworth and Cobbs (1923), Carroll (1930), Portainer (1948), Newman, Duncan, Bell & Brandt (1952), Bliesmer (1954), Gowen (1955), showed that superior intelligence was associated with high academic performance.

Briggs (1962) Mitchell (1963) Keller and Rawley (1964) found that intelligence was the major factor influencing academic achievement, Torrance (1965) concluded that more intelligent children with more capabilities are likely to accomplish more on academic tasks. Lewis (1968) found intelligence and academic achievement to be highly correlated. Lalithamma (1975) reported that achievement in mathematics was positively related to intelligence. Malik (1977)
found that intelligence is highly correlated with achievement in chemistry. Intelligence seemed to be instrumental in achievement.

Jenson (1980) attributed individual differences in performance to intelligence in addition to differences in sensory or motor-functions and further said that the speed of performance should be the only index of performance. Jarial (1981) reported that intelligence and academic achievement were positively and significantly related among the groups. Yue (1982) found that, despite controversy surrounding the use of traditional mental tests, they remain valid predictors of academic status. Mohan and Bhatia (1985) revealed that superior psychomotor performance was associated with high intelligence. Review of the above studies indicated a trend that performance of the high intelligence group tends to surpass that of their low intelligence counterparts.

Franzen (2000) indicated that proponents of multiple intelligences, brain-based learning, and learning style theories suggest that an awareness of learner's strengths and weaknesses can help facilitate effective instruction in education. Because educational systems neglected to measure student self-perceptions regarding a spectrum of intelligence areas, often, effective strategies that develop student potential are not implemented. This study determined student self-perceptions regarding the multiple intelligence areas of predominance including: verbal/linguistic, logical/mathematical, visual/spatial, bodily/aesthetic, musical/rhythmic, interpersonal, intrapersonal and naturlist. It compared self-perceptions of dominance among fifth-grade, sixth-grade, seventh-grade students at a middle school in the Midwest. It also investigated teachers’ and students’ perceptions regarding which multiple intelligences are most valued in a selected middle school. Composite means and rankings showed that students perceived the naturalist area of intelligence to be their most predominant domain and the verbal/linguistic to be their least predominant domain. Independent <italic>t</italic>-tests identified significant differences between students’ and teachers’ perceptions in three multiple intelligence areas (verbal/linguistic, logical/mathematical, and interpersonal). The Pearson Product Moment correlation showed 26 significant correlations in relationships between predominant and other areas of intelligence.
Siegel (2000) indicated that the first objective of his study was to examine the effects of an instructional method to increase students’ use of relevant scientific evidence in their decisions. The second goal of the research was to test whether the instructional activities could promote students’ beliefs that science is relevant to them, because attitudes have been shown to effect students’ performance and persistence. Third, the study was designed to determine whether the instructional activities would affect students’ belief that their intelligence is not fixed but can grow. The control group did not show significant improvement on decision-making tasks, and the experimental group showed marginally significant gains (p=.06) according to the Rasch analysis. A measure of students’ understanding of coherent argumentation was correlated with higher decision post-test scores. Over time, both classes significantly regarded science as being more relevant to everyday life. Students’ attitudes about ability showed significant changes.

Ford (2000) examined the effectiveness of integrating Multiple Intelligence (MI) techniques and Integrated Thematic Instruction (ITI) in improving student achievement for seventh grade students in junior high school. Significant differences were found in relation to instructional group membership as students in the traditionally instructed classes had higher pre to post-test gains in Reading Comprehension than students in the MI/ITI instructed classes. However, students in the MI/ITI instructed classes had higher pre to post-test gains in Language-Totals than students in the traditionally instructed classes.

Babo (2001) reported that intelligence quotient and socio-economic status has the greatest impact on reading and/or language arts and mathematics achievement and that the existence of a possible causal relationship between participation in instrumental music and superior academic achievement may be proposed.

1.11 ACHIEVEMENT AND RETENTION

Achievement plays a significant role in almost all aspects of human life, as in arts, science, technology and agriculture. It has assumed enormous importance in view of its practical value. It helps in shaping the career of the
individual and planning for future education. It forms the main basis of admission and promotion in a class. Achievement is a unique, prime and perennial responsibility of a school or any other educational institution established by the society to promote wholesome academic growth and development of child. Achievement is the core of wider term educational growth and perhaps no one would deny the importance of academic achievement in child’s life. It is common observation that success in the academic achievement serves as an emotional tonic and any damage done to a child in the home or neighbourhood may be partially repaired by the success in school.

Achievement of pupils is referred to as the success or proficiency gained during their academic career in the subjects which are assessed by the school authorities with the help of achievement tests which may be either standardized or teacher-made. In other words, academic achievement is the sum total of information a student has gained when he has completed a course of instruction in a particular grade that he has obtained on an achievement test.

In more general terms, achievement means the performance of the pupils in so-called academic subjects like reading, writing, arithmetic, science and history education. Therefore, achievement may be defined as a measure of cognitive learning outcomes of Bloom’s taxonomy at knowledge, understanding and higher order levels (to include application, analysis, synthesis and evaluation of knowledge) in a specific subject or a group of subjects.

Biggs (1993) proposed a framework for understanding student learning through consideration of the relations between what teachers and students do and think and the nature of student learning outcomes. The model commonly referred to as the 3P model (presage, process and product factors), represents not only a linear movement from presage to process to product, but also allows for interactions between the components that form an integrated system, which is in equilibrium. A change to any part of the system affects other parts of the system. This 3P model has been present in Fig. 1.1.
Presage factors include both student characteristics and aspects of the teaching contexts. Student presage factors are relatively stable learning-related characteristics that include conceptions of learning, prior knowledge, motivation, work habits, study skills, abilities; locus of control orientation, perceived self-efficacy, learning style, and social and cultural factors. Teaching presage factors include conceptions of learning and teaching, teaching style and methods, curriculum organization, task difficulty, assessment procedures, time available, freedom allowed, classroom management, resource materials, and the classroom climate (Dart et al., 2000).

Process factors are the result of the interaction between student and teaching presage factors and refers to the way students handle the learning task by adopting deep, surface, or achieving approaches to learning. Deep is defined as a learning approach characterized by an intention to seek meaning of the material being studied by using the material to elaborate and transform it. In the surface approach, the material being studied is reproduced using routine procedures. A deep approach to learning is associated with constructivist teaching (Biggs & Moore, 1993; Dart, 1997; Tang, 1998) which suggests that
learners actively construct knowledge for themselves. On the other hand, a surface approach to learning (Biggs & Moore, 1993; Dart, 1997; Tang, 1998) is related to the traditional transmission model of teaching in which information is transferred from teachers to learners and in which learners assume passive roles.

Product factors are the outcomes of learning and are determined mainly by the approaches to student learning. Outcomes may be categorized qualitatively (how much is learned), qualitatively (how well it is learned), and institutionally (relating to either qualitative and qualitative outcomes) or both, leading to the awarding of grades (Dart et al., 2000).

Clarke and Dart (1994) proposed that a convenient way of integrating elements of models of learning into personal and environmental factors is to classify the elements as cognitive and affective. They provide as an example a learning environment that emphasized problem-solving activities and fostered the development of a variety of cognitive skills. Further, a classroom climate can exist in which interpersonal conflicts can be resolved so that students’ feelings of self-worth are developed and retained; that is, climate also can have an affective dimension. Thus, both cognitive and affective dimensions of the classroom environment can influence learning behaviour.

Classrooms perceived as high in personalization are associated with the use of investigative skills and strategies, which, in turn, influence the use of deep approaches to learning. Thus, the relationship between personalization and investigation in classroom environments mediates the relationship between qualitative conceptions of learning and deep approaches to learning. Qualitative conceptions, therefore, have both a direct and indirect effect on deep approaches to learning. The use of surface approaches to learning is likely to preclude the adoption of deep approaches. (Dart et al., 2000)

Flynn (2000) examined the effectiveness of cooperative learning process where students became more comfortable communicating with others and made them more secure in their abilities. The process also involves a change in the teacher’s role from lecturer to facilitator to organize group and to encourage working together. Different lessons and laboratory exercises had to be
implemented for the program to work. The findings were that cooperative learning does increase the students' understanding of the material, retention of knowledge, and makes them feel better about themselves and school.

Khalaf (2000) explored variables related to chemistry achievement of 12th grade science students in the United Arab Emirates (UAE). The focus is to identify student, teacher, and school variables that predict chemistry achievement. The results indicate that demographic, home environment, prior knowledge, scholastic ability, attitudes and perceptions related to chemistry and science and student perception of instructional practices variables correlated with student chemistry achievement. The amount of help teacher received from the supervisor, class sizes and courses in geology were teacher variables that correlated with class chemistry achievement. Results indicate that the strongest predictors of chemistry achievement are prior achievement in science, Arabic language, and mathematics; student perception of teacher effectiveness; and teacher experience and expertise. Females tend to achieve better in chemistry than males. Miles (2000) investigated that the student participants of a science enrichment program also agreed more than those students who had not participated in one that self-motivation influenced academic achievement in their present science class. Finally, participants of an extra-curricular science activity agreed more than those who did not participate in such activities, that a tutor was also influential in their achievement, completion of a science course, and influential in future aspirations in science.

Cleverson (2001) examined the responses of families to bilingual communication methods, text versus video, designed to facilitate school to home communication to increase parents involvement and seventh grade students achievement in the science fair project. Significant results were that the video communication method was positively associated with student achievement on the science fair projects.

Tyrrell (2001) indicated that the National Science Foundation predicts a shortage of scientists and engineers within the next 15 years. Some agree that the participation of women in science will be required to help meet the future demand for scientists. Consequently conscientious teachers search for learning
strategies that provide opportunities for young women to achieve success with others in their science classes. This research concerned a note taking and teaching strategy that involves seventh grade science students. The results showed that achievement improved significantly when reviewing or using guided notes independently. The results also showed that significant improvements in achievement were not observed when participants used guided notes and reviewing together. Research showed that both boys and girls significantly improved their achievement in science equally well for all treatment conditions.

Retention

Learning implies a relatively permanent change in behaviour that results from a proactive or an activity and, thus involves a three-step sequence of initial acquisition, retention and use. But retention can occur only if something has been acquired initially, and transfer of acquired outcomes to a new situation can occur only if the outcome has been retained (Klausmeier and Goodwin, 1966).

Forgetting results from disuse, interference, reorganization, oblitative sub-sumption and motivated forgetting. Retention is usually measured by use of tests which the pupils had taken on some previous occasion during the experimental period, either as a protest or as a test of immediate learning at the end of instructional period.

In general two factors are cited most frequently as affecting memory of new material: (i) whether the new information is consistent with or can be related to prior knowledge, and (ii) how the new information is processed. Information that is consistent with or can be related to prior knowledge is more easily remembered than information that is not consistent with or relatable to prior knowledge. Information processes (i.e., activities during testing) are known to be critical determinants of how information is organized in long-term memory and how much of it is remembered (Pressley & Meter, 1995).

Contrary to popular belief, people retain a large portion of what they learn in school or college. Several factors contribute to long-term retention. Not surprisingly, the degree to which students had learned the material in the first place is one factor (Bahrick and Hall, 1991). Instructional strategies that actively
involve students in lessons contribute to long-term retention (Slavin, 1997). Long-term retention of information that is learned varies a great deal according to the type of information. For example, concepts are retained much longer than names (Conway, Cohen and Stanhope, 1991). In general, retention drops rapidly in the first few weeks after instruction but then levels off (Bahrick and Hall, 1991). Whatever students have retained about 12 to 24 weeks after instruction, they may retain forever (Slavin, 1997). It is interesting to note that the effects of ability on retention is unclear. Higher ability students score better at the end of a course but often lose the same percentage of what they had learned as low-ability students do (Semb and Ellis, 1994).

Information represented both visually and verbally is recalled better than information represented only one way. For example, a person remembers a face better if he also knew a name, and one remembers a name better if he can connect it to a face (Mayer and Anderson, 1991). Rothkopf (1965) ascertained that presentation of questions at various points in learning process can increase retention of facts, answering questions and produce a generalized improvement in retention of other facts. Questions give rise to ‘inspective behaviour’ or ‘mathemagenic responses’ which facilitated retention of meaning for learning.

Lee (1977) advocated that high kinetic structure was a predominant factor in producing greater knowledge, acquisition and retention. Also, high structure with visuals did not produce greater retention than high structure without visuals and low structure without visuals. Kaplan & Pascoe (1977) reported that concept illustrated in a humorous manner might be learned and retained more easily than a concept presented in a dull style. Ware (1977) found that Bloom’s Mastery Strategy resulted in greater retention and transfer than Keller’s strategy. Halpin and Halpin (1982) found that students who studied for and took a test not only achieve more but also retained their learning longer than the students who ‘studied in order to learn rather than for a rest’. Duchastel and Nungester (1982) revealed that practice of following learning period with a test situation can drastically enhance long term retention of what has been learned.

Mackenzie and White (1982) contrasted students in eighth and ninth grades learning geography under three conditions: traditional classroom
instruction, traditional instruction plus fieldwork, and traditional instruction plus
filed work plus active processing of information involved in fieldwork. Twelve
weeks later (after summer vacation), the active processing groups had lost only
10 percent of the information, while the other two groups had lost more than 40
percent. Chitriv (1983) found that Advance Organizer Model and Concept
Attainment Model were superior to the traditional method in knowledge transfer,
heuristic transfer, short-term retention and long-term retention of concepts.

Sood (1988) reported that high intelligence students retained more than
low intelligence students. Students taught with concept attainment model
retained in Hindi much more than those taught with Advance Organizer Model.
Specht & Sandling (1991) contrasted undergraduates who learned accounting
using traditional lectures or role playing. The traditionally taught students lost 54
percent of their problem-solving performance after 6 weeks, while the role
playing group lost only 13 percent.

Mehra (1992) reported that retention is dependent upon intelligence and
that the low intelligence group exhibited more forgetting as compared to the high
intelligence group. Retention is equally effective for learning at knowledge as
well as at the comprehension level of objectives. Backer (1993) indicated that
visual advance organizers lead to better retention of nursing skills than verbal
advance organizers.

Semb and Ellis (1994) in reviewing research on retention, noted that
laboratory studies of retention of nonsense words and other artificial material
greatly underestimate the degree to which information and skills learned in
school can be retained. Robertson (1995) found that Advance Organizer (AO)
meta cognitive (MS) strategies were consistently higher than all the other
strategies on both learning and retention, such as AO versus AO & MS, AO
versus MS and MS versus the control group.

Mehra and Khare (2001) reported that retention was found to be
dependent upon instructional treatment. Students taught through Inductive
Thinking Model and Advance Organizer Model retained comparably. But
students taught through Inductive Thinking Model or Advance Organizer Model
retained more than those taught through the conventional method. High
intelligence students retained more than their low intelligence counterparts. Students exhibited more retention at comprehension category than at the knowledge category of objectives.

Neeru (2001) reported that class V field independent students retained more than their field dependent counterparts in maths. Students at knowledge category retained better as compared to the comprehension category of objectives.

1.12 NEED OF THE STUDY

In most classrooms the teacher is perceived as the knowledgeable one, but the existing teacher student ratio limits the teacher’s ability to instruct with each learner’s Zone of Proximal Development (ZPD). Further discussions tend to be dominated by an I-R-E discourse pattern in which the teacher initiates the conversation (frequently by asking a question), a student responds, and then the teacher evaluates the response (Carden, 1988; Mehan, 1982). Because only one student can talk at a time and the pattern actually leads to more teacher than student talk, such discourse patterns limit students’ opportunities to talk and restrain the teacher’s ability to hear all students’ responses; these constraints, in turn, restrict the potential to work within each learner’s ZPD. Because the teacher-student ratio is not likely to change, some educators argue that increased small-group discussions may enable greater student participation and growth (Webb, 1992).

One way to address the issue of student decision making within small-group discussions is to provide opportunities for them to lead their own groups. Instruction is a key component of the program because an important aspect of the teacher’s role as the knowledgeable other is to provide continued support for new interactional patterns and goals and to facilitate increased student responsibility for learning (Au, 1993). At the same time, students are expected to interact in small groups in which no teacher is present; therefore, they must assume responsibility for the content and help one another to participate. Initial research on student-led discussions about literature has provided encouraging results but this work needs to be expanded to understand better how students
can actively help one another participate effectively in discussions about the texts they read.

The research so far supports the notion of small group interactions related to literature and argues for increasing student responsibility for the content direction and flow of discussions. Provision for student-led groups seems to be a promising step, but little is known about how students might help their peer participate in such a group. Therefore, to modify current practice to include provision of additional support for learning, either the teacher-student ratio needs to be lowered or instruction must provide opportunities for peers to assist one another in their learning. This second option seems more realistic.

The topic of peer tutoring (PT) was chosen because such a program can become an important and integral part of any school program. Peer tutoring can be one of the several instructional opportunities that can be used to help meet the needs of students. It has become apparent that any school environment needs to offer a variety of strategies to help meet the unique and different needs of each child. One must not forget that strapped economic times have led to reduced spending and fewer professionals to help meet the needs of students. The implementation of a successful peer tutoring program can increase the learning opportunities offered to students when these opportunities would otherwise be reduced because of budget restraints.

Although numerous anecdotal reports and a number of researches have investigated these beneficial instructional components and contributed to academic gains by both tutors and tutees, few methodologically sound empirical studies have been conducted in this area in India. Instructional treatment influences not only the achievement, retention or attitudes of students, but also the classroom learning environment.

So, the investigator proposed to study the effect of teacher directed instruction followed by peer tutoring on achievement in science and classroom learning environment of high school students.
1.13 STATEMENT OF THE PROBLEM
The present research study was entitled as follows:
EFFECT OF TEACHER DIRECTED INSTRUCTION FOLLOWED BY PEER TUTORING ON ACHIEVEMENT IN SCIENCE AND CLASSROOM LEARNING ENVIRONMENT OF HIGH SCHOOL STUDENTS.

1.14 OBJECTIVES OF THE STUDY
1. To compare the mean gain on achievement scores of the two groups of class IX students taught science through teacher directed instruction followed by peer tutoring and traditional instruction.
2. To study the effectiveness of the two instructional treatments for high and low intelligence groups.
3. To study the effectiveness of the two instructional treatments for high and low intelligence groups at knowledge and comprehension categories of objectives.
4. To compare the retention scores of the two groups of class IX students taught science through teacher directed instruction followed by peer tutoring and traditional instruction.
5. To study the effectiveness of the two instructional treatments for high and low intelligence groups with respect to retention.
6. To study the effects of two instructional treatments for high and low intelligence groups at knowledge and comprehension categories of objectives for retention scores.
7. To study the attitudes of students of the experimental group towards peer tutoring.
8. To study the effect of instructional treatment on learning environment of the classroom as perceived by high and low intelligence students.

1.15 HYPOTHESES
Hypotheses for analysis of gain scores on achievement in science:
H1. The two instructional treatments yield comparable mean gain on achievement scores in science.
H2 The high and low intelligence groups yield equal mean gain on achievement scores.

H3 Comparable gain on achievement scores are yielded by the students at knowledge and comprehension categories of objectives.

H4 There is no significant interaction between instructional treatment and levels of intelligence.

H5 There is no significant interaction between instructional treatments and categories of objectives.

H6 There is no significant interaction between levels of intelligence and categories of objectives.

H7 The two instructional groups attain comparable mean gain on achievement scores with both the levels of intelligence at knowledge and comprehension categories of objectives.

Hypotheses for analysis of retention scores:

H8 Retention is independent of instructional treatment.

H9 Retention is independent of levels of intelligence.

H10 Retention is independent of categories of objectives.

H11 Students taught through different instructional treatments attain comparable retention scores at knowledge and comparable retention scores at knowledge and comprehension categories of objectives.

H12 Students of high and low intelligence retain comparable when taught science through different instructional treatments.

H13 Students of high and low intelligence retain comparably at knowledge and comprehension categories of objectives.

H14 Students of high and low intelligence retain comparably at knowledge and comprehension categories of objectives when taught through different instructional treatments.

Hypothesis for analysis of attitude scores:

H15 High and low intelligence groups exhibit comparable attitude towards peer tutoring.
Hypotheses for analysis of learning environment scores:

H$_{16}$ The two instructional treatments yield comparable mean gain scores on learning environment inventory.

H$_{17}$ High and low intelligence groups exhibit comparable mean gain scores on the learning environment inventory.

H$_{18}$ High and low intelligence groups for different instructional treatments yield comparable mean gain scores on learning environment inventory.

1.16 DELIMITATIONS

❖ The study was limited to studying the effectiveness of only two instructional strategies, viz., teacher directed instruction followed by peer tutoring and traditional instruction.

❖ The study was conducted on class IX students of Kalapani Higher Secondary School, Kalapani, Assam.

❖ Only six units of science syllabus of class IX, affiliated to SEBA, Guwahati (Assam) were selected as content matter for the instructional treatment.

❖ The experiment was limited to about 50 days of the academic session.