CHAPTER II

THEORETICAL OVERVIEW

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2.1 INTRODUCTION

The hegemonic trends of market economy in the context of ongoing globalization tend to impose individualistic forms of competition. Unfortunately, educational systems in many parts of the world have been promoting teacher-fronted and highly individualistic ways of learning and achieving. Traditionally they have emphasized individualistic achievements and unfair competitions resulting in a division of winners and losers, which, in turn, has nurtured a sort of hostility among students. Such educational systems have also contributed to capitalist modes of accumulation of wealth besides being conducive to the benumbing of critical sensibilities. Also it seems that the experience of study and forget after the exams is no more helpful in problem-solving in real life situations. Consequently students are the losers. Not only are they getting deprived of a modern-world class education which they deserve, but they are also missing better opportunities for effective learning in their academic life.

Despite the flair and flame for individualistic achievements, there is an innate urge for humanistic ways of achieving things together. Educators and learners need to realize that the benefits of learning and achieving together are immense in terms of interdependence. Peer learning, as a drastic shift from traditional models, provides better opportunities for learners to develop successful learning and communication strategies; therefore, it is likely to address and solve the deficiencies found in the traditional models. To cite some examples, Peer Tutoring, which is a process-oriented approach lays emphasis on the process of learning in well-organized contexts rather
than products of teaching in de-contextualized environments, fosters co-operation rather than pure individualistic competition, values participation of all class members rather than merely higher achieving students, and appreciates meta-cognitive strategies rather than survival skills.

Purposeful communication, attention, motivation, active engagement of all learners etc. are of critical importance to effective learning. Needless to say, all these pivotal factors are, to a large extent, neglected by the outdated instructional models like our traditional teacher-fronted chalk-and-talk systems. It is true that peer tutoring gives more importance to all these pivotal factors in the teaching learning process.

2.1.1 Peer Tutoring – Advantages

When one decides to ask peers for help, they will usually ask someone they have confidence, know the material and will be able to help them. The reasons students might need a tutor are as follows: - falling behind in class because they do not understand the subject matter, falling behind because they do not understand the teacher, they are slow learners, they learn using a different method from the one the teacher uses, they have missed a lot of classes, and finally, language might be a barrier if the student and the teacher do not share a common language.

Actually Peer tutoring is a teaching strategy that we all have used at one point or another in our academic practice. Peer tutoring basically means a student teaches another student. There are various
reasons that might lead to students needing a tutor. Given a choice, students are more likely to opt for a peer tutor rather than a professional tutor. The reasons students resist a professional tutor can be: knowing the family cannot afford one, they do not want to be embarrassed by admitting they are having problems in school, they might be intimidated by having someone older than them helping them and they might find it difficult to relate to someone who is not their peer. So it is true that the students will be more confident to be engaged in studies along with their peers and to have a peer tutor. The main advantages of peer tutoring are:

2.1.2 Peer Tutoring Fosters Learning in Social Context

Cross-cultural and historical evidence indicate that children’s peer relations evolved under conditions which favor small mixed-age groups (Hartup, 1983) since the late 1970s. The idea that cognitive development occurs primarily among individuals of mixed abilities has become a central issue culminating in the new well-established field of social cognition. This has led to an interest in children’s ability to teach other children, or work jointly towards a solution of problems. Peer teaching or collaboration is usually advocated on grounds that it brings intellectual gains; the likelihood that it is more fun, pleasant, or emotionally fulfilling for children to work together than alone or with adults is seen as a fringe benefit. Such evidence was interpreted by some as indicating that the child first learns that other people can perceive the world differently, and eventually acquires the ‘knack’ of co-ordination of his or her perspective with others. Psychologists working in the Piagetian frame of reference have highlighted the
central role of perspective taking, or the 'co-ordination of perspective', in peer relations (Cohey et al., 1982).

According to Piaget, social development involves a cognitive process of decentring which manifests itself in the growing child’s increased ability to imagine others’ points of view. Social cognition research supports the idea that children can scaffold each other’s progress and can understand others’ problems and also there is the didactic transmission from one child to another. Thus in peer tutoring, program learning takes place in a social context.

2.1.3 Peer Tutoring Encourages Pupil - Pupil Relationships.

The humanist psychologist and educator Carl Rogers expounded the idea that there is more to learning than intellectual performance. Rogers distinguished between conventional school learning, which "involves the mind only.....does not involve feelings or personal meanings (and) has no relevance for the whole person, and a significant meaningful, experiential learning" (Rogers, 1982). Whatever the teaching ideology, nobody would seriously deny that the impact of the learning environment on the child is first and foremost ‘experiential’ and that peers have a special role in the child’s experiential environment. Just in what ways peer relations are special in education is a current issue in developmental psychology. What children learn from and with other children can have a more profound effect than what they learn from a teacher. Discussing issues concerning social competence, Erikson suggested that in ordinary perception, "contexts are constituted by what people are doing where and when
they are doing it". Moreover, the people who interact within a location at a given time become environments for each other (Erikson, 1981). This area concerns the conditions for peer relations created by the school, ways in which schoolmates constitute a child’s environment, and educational implications of peer relations. Two ‘applied’ research areas are rapidly expanding: peer tutoring co-operation and collaboration (Footetal., 1982) and separately, playground behaviour, with special attention to bullying.

2.1.4 Peer Tutoring Considers the Learner Centered Education

Learner centered education relies on planning more responsibility in the hands of students. The learner-centered education will foster an environment that will increase the overall quality of student’s learning experience in the modern engineering educational area. Actually peer tutoring not only enhances the co-operation among the students but also encourages the opportunities to construct and synthesize complex ideas, skills and values by the students themselves. In the present day educational system the pupils are given more importance and the students discover facts and concepts. Peers together will construct knowledge. So peer tutoring is very much acceptable and it should be promoted in all levels of education. The learner centered education has many advantages over the teacher centered education.

While the teacher centered education gives importance to cover the discipline, through the learner centered education students learn how to use the discipline, how to integrate disciplines to solve complex problem. Here students construct knowledge and learning is viewed as
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a cognitive and social act. Co-operative learning, collaborative learning and interactive learning are stressed in it. It is noticeable that:

1. Use of peer tutoring structures can increase social motivation (Johnson, Maruyama, Nelson & Skon, 1981; Slavin, 1987).
2. Level of engagement influences student motivation to achieve classroom goals (Ryan & Deci, 2000).
3. Peer tutoring is an economically and educationally effective intervention for persons with disabilities that can benefit both the tutor and tutee, socially and educationally by motivating them to learn (Miller & Miller, 1995).
4. Peer tutoring interventions are more effective for students of a) urban settings; b) low socio-economic areas; c) minority students (Rohrbeck, 2003).
5. Peer tutoring gives teachers the capability to accommodate a classroom of diverse learners to improve academic achievement across ability levels and content areas.

2.2 HISTORICAL BACKGROUND OF MATHEMATICS

Mathematics holds the mirror up to civilization. It is no exaggeration to say that the history of Mathematics is the history of civilization. Mathematics can take pride in the fact that their Science, more than any other’s is an exact science, and that hardly anything ever done in the Mathematics has proved to be useless. The geometry of the Greeks and the arithmetic of the Hindus are as useful and admirable as any research of today. Mathematics has led to the development of various subjects, vocations and technology. Mathematics has been a
progressive science which is still playing an important role in various walks of life.

Humanity has developed a systematic procedure for storing and passing on information from generation to generation—history. Much of what is passed on relates to Mathematics. Beginning recordings are more mathematical than historical. People chronicled how many long before they recorded events. Even civilizations that developed at different rates and locations exhibit a wide variety of mathematical commonalties. Listing or keeping track of things precedes a system of naming numbers in almost every development. Once numbers are named, rules of operation develop.

The origination of numbers is difficult to pinpoint in history. Early documents from China, Egypt, India, and Mesopotamia all show questions dealing with "how many"? This implies that the idea of cardinality was around long before the ability to write. This, however, can easily lead to the conclusion that the idea of sets must be one of humanity’s earliest fascinations. As time progressed, body parts and words were used to represent specific numbers. It appears as if it was clear that the emphasis was not on the order in which things were presented but, rather, on the total number. Developmentally, a giant stride forward occurred when it dawned on people that the last cardinal number named also gave a name for the total number of elements of a set. Even with this, it was not long before the number of objects exceeded the names for numbers. Body parts were limited. Another way was needed. This need prompted numeration systems. It must be remembered that spoken and written vocabulary limitations existed.
and, thus, formalization and extension of a numbering system was not an easy task. Look at the Roman numerals and you will see how it could have been cumbersome to write larger values. If nothing else, it should give an added appreciation for our Hindu Arabic place value system.

The Greeks and the Pythagorean Society did a lot to develop numbers. The Pythagorean Society was open only to aristocrats and all teaching was verbal. Written work would permit secrets to leak out more readily. The Pythagorean spent a lot of their energy on geometry, but they did develop some good number structure. They developed tables and the abacus to do computations. Although they would teach people how to do computations, they would not reveal how the tables were developed. They worked with a wide variety of topics seen today, including perfect squares, triangular numbers, perfect numbers, abundant numbers, deficient numbers, letters representing numbers, primes, and amicable numbers. These investigations involved computations, and that created a demand for some flexible, comprehensive, organized way to write numbers. This, in turn, led to place value.

Through the ages, different bases have been used for place value systems. Although base 10 has become the dominant base, the Duodecimal Society still pushes for base 12. Other bases that were used in the historical development include 20, 60, and 10,000. Imagine trying to get students to memorize operation facts in base 20! As the place value system got refined, computation demands increased.
Computational devices have been available for a long time. Society slowly adapts to new devices and, in the process, provides acceptability. The abacus was probably the first computational device. It is great for addition and subtraction, but the major drawback is that the previous step is consistently eliminated. In 1946, a competition was held between a desk calculator and an abacus. Both operators were equally good with their respective devices. The problems included adding, subtracting, multiplying, and dividing three – to six – digit numbers. The abacus operator easily won the competition. Even today, we marvel at the abacus skills of speed and accuracy exhibited by some individuals. Other computational devices are Napier’s bones, the slide rule, adding machines, desk calculators, pocket calculators, and software.

We take so much for granted. Arithmetic as we know it did not take form until close to the end of the 15th century. Fractions gave mathematicians of antiquity fits. Only in the past 500 or 600 years have fractions been relatively easy to deal with in a number system. Decimals did not appear until the 16th century. Think about it! How could they do some of the computations? It gives an even greater appreciation for the work of those individuals who developed so much of our Mathematics. The appreciation can be heightened by realizing that Napier did not develop the concept of logarithms until the beginning of the 17th century. Formative slide rules are shown to have existed in about 1620 A.D. Newton suggested a “runner” for the slide rule in 1675, but it was not put into use until about 1775. Pascal introduced the first line of computers in 1642. Leibniz completed a
computing machine in 1694 and it had a moving carriage, wheels going in opposite directions for addition and subtraction, and latches to prevent over rotation.

Babbage created a 'difference engine' in 1839, and his son completed the work and published results in 1906. Babbage had the idea, but the technology of the time was too limited to meet his dreams. He needed finer machining tools, electronic circuits, and better alloys. Given these, he had today’s computer. Hollerith developed the idea of holes in cards in 1880. Eventually, IBM adopted this process for use with early computers. Burroughs in 1888 designed a machine that would print figures. Electronics entered the picture in 1944, transistors in 1948. By 1961 computers were taken over by transistors, and the rest is history (Kadhairavan & Balasubrahmanian, 2005).

Algebra was available in rudimentary stages from about 1700 B.C. through 1700 A.D. Symbolization developed slowly, and only minor improvements were made in algebra until the general cubic was solved.

Modern symbolism began to emerge in the 14th century. Concepts such as negative numbers were unknown or denied by many mathematicians from antiquity. Realizing these limitations should give you new appreciation for how far we have come in recent years. It certainly gives new meaning to information explosion. Mathematics as we know it started to be distinguishable only in the 19th century. Mathematics became known not as a tool, or as a descriptor of the world, but as a science. This development was a direct result of more and more people asking "why" something worked out the way it did.
With these developments came higher levels of abstractions. Undefined terms were established and more rigorous definitions were devised. There was the understanding that, in response to the realization that as long as terms were loosely defined, varied interpretations would be available. The 20th century found Mathematics maturing on all fronts. It expanded in some areas and developed others. In accordance with the needs and requirements of the advancement of the society the mathematical achievements also attained timely advancements and it has glorified the modern world.

2.3 HISTORICAL BACKGROUND OF PEER TUTORING

The textbook definition of peer tutoring is "a system of Peer instruction in which learners help each other and learn (themselves) by teaching" (Goodlad & Hirst, 1989). Key to this definition is the word peer, meaning someone with the same or a nearly equal status as the person being tutored, who, as such, is not a professional instructor. Peer tutoring has played an important part in education and has probably existed in some incarnation since the beginning of civilization. But the first recorded use of an organized, systematic peer tutorial learning project in the Western World didn’t come about until the late 1700’s. Valentine Trotzendork, a German who founded the Goldberg school in Silesia, is thought to have come up with the concept of having children teach each other. This happened around 1531. Even though he was a school dropout because he had no money to pay for school, he believed that the best way to learn was to teach (Briggs, 1998).
Next we can take a look in the United Kingdom, where in 1798; a Quaker school master founded a school for the poor. Due to lack of funding, he was unable to hire any teachers and so he decided to have the students teach each other. Actually, in the United Kingdom, from 1848 onwards student teachers were recognized as being teachers (Briggs, 1998).

In the 18th and 19th centuries peer tutoring became an effective way of giving underprivileged (at this time, sadly, only male) children a reasonable shot at an education. The first systematic approach to peer tutoring is credited to Andrew Bell, who was the superintendent of the Military Male Asylum at Egmore, in England (Goodlad & Hirst, 1989). When Bell took the reins at this institution, the asylum was run as a school for boys whose fathers had been killed during war time. Bell transformed the asylum into more of an official school.

Like many good ideas, Bell’s thoughts on implementing peer tutoring came from a very strange, almost unconscious source. He observed several children drawing in the sand at a beach one day. Since the rest of his teaching staff thought this was absurd, Bell began to use monitors. Children to teach each other with sand trays were indeed being used. Bell later realized that the use of these child monitors was a much more significant discovery than trying to cut costs by using such a highly unorthodox and sandy teaching practice (Goodlad & Hirst, 1989).

So during 1791 and 1792, Bell reorganized his school so that every person had a specific role with associated tasks. The students are grouped according to their level of achievement. If a student was doing
well, he could be promoted to a better class; if his work was sub-par, he could be demoted to an inferior one. Bell arranged each class in such a way that half of the students would perform as tutors and the other half would receive tutors instructional help. Also, teachers, teaching assistants etc. would roam throughout the school helping children, monitoring the tutors and quizzing students to make sure the teaching system was working properly.

With this experimental system in place, Bell reasoned that the tutors "Enabled their pupils to keep pace with their classes, in which otherwise some of them would fall behind, and degraded to lower classes, or continue in their classes, by never learning any one lesson as it ought to be learned"(Goodlad& Hirst, 1989). Bell’s experiment is thought to be one of the first examples of the systems approach to educating people.

Making use of Bell’s tutorial experiment a few years down the line was a man named Joseph Lancaster, who was also enticed by the idea of providing education for children who would not otherwise get it, often because of the social class of their families. Lancaster opened a school in London, England in 1801 where he was responsible for approximately 350 students. Realizing there was no way he could teach this number of students and maintain order at the same time, he decided that boys who knew a little were qualified candidates to teach those who knew even less, and gave these boys the means to do so (Brutee, 1990).

Lancaster modified Bell’s method somewhat by giving his tutors detailed instructional materials to help them assist others and
themselves. He designed very structured, organized teaching materials; he also came up with answer keys, which students could use to drill other students on the material they were learning, while older students monitored them. This was done while Lancaster was teaching a different group of students that may not have even been familiar with subject matter to actually be responsible for teaching it. They did this by way of possessing the answer keys and watching the other students work out problems before giving students the answers.

Another key player in the introduction of systematized peer tutoring was William Fowle. Fowle also used a monitorial approach in his school in England in the late 1800’s. He conducted studies on his students and began to provide some educational theory to support peer tutorial practices (Ehly & Larsen, 1980). Fowle concluded that children could, in some respects be better teachers than adults could, because children know that they are in the same boat. Ideally, this causes them to be more considerate and respectful of each other feelings, rather than feeling panic due to having to work with an adult who they may feel is judging them and their work every step of the way, and thus holding them back from learning.

American educators who shared the lack of financial backing necessary to hire teachers in great numbers heard of the ideas of Bell, Lancaster and Fowle (Ehly, 1980). Taking a cue from these men from their British motherland, American instructors often would rely on certain students to teach others before a school system was put in place. This was the birth of peer tutoring in America. And while it is highly likely that tutoring in very different formats was going on in higher
education (and elsewhere), it is important to note that these men’s ideas were extremely influential (and egalitarian) before the use of professional teachers became more widespread in the US (Goodlad & Hirst, 1989).

Even in America, the same education developments took place during the 1960's. Many people held the belief that by students teaching each other; they were able to constantly keep reviewing their studies. In the 1960's the federal government encouraged the use of peer tutoring in an effort to reduce the gap between the poor and middle class (Allsopp & Beirne, 1997).

2.3.1 Peer Relation and Development

A peer system refers to the interactions, relationships and group structures involving persons in a group of nearly the same developmental level. Age level is often used as an indicator of peer status. However in many instances age mates are not peers. Class groups are often homogeneous on a number of characteristics, such as age level, achievement level, learning difficulties, and so on. The goal of this entry is to describe the peer relations in school classes for children’s social, emotional, and personality developments.

Peer relations in a school require attention for several reasons. First, for a substantial number of children peer problems lead to long term disturbances, such as early school dropout, delinquent behaviour in adolescence, and psychopathology in adulthood (Parker & Asher, 1987). There is no obvious reason for schools to restrict their mission to teaching and learning of cognitive skills. Many children are
victimized by aggressive peers, and tolerance of aggression in school offers for some children systematic instruction that goals in peer relations can be achieved in an aggressive way and peers can be involved in their aggression. Because school is usually obligatory, such theorists consider that children have a basic right not to be systematically exposed to peer aggression in school, and to learn pro-social interactive and problem solving skills (Olweus, 1991). Second, positive peer relations facilitate instruction and learning in class and peer problems disturb these activities [Elton Report, 1989]. Schools have an obligation to eliminate factors that hinder children’s effective learning and teacher’s instruction. Third, the class group and the school are excellent setting for the support of children and adolescence with peer problems. It is estimated that 10 to 20 per cent of all children are chronically rejected, isolated or victimized by others or suffer major repercussions from their own aggressive behaviour and from bullying others (Newcomb et al., 1993; Olweus, 1991). In addition, this percentage may vary from study to study depending on assessment methods and the composition of investigated group.

2.3.2 Peer Competence and the Peer System

In a conceptual framework for the understanding of social relationships in groups, Hinde (1976) has distinguished three hierarchic levels: interactions, relationships and group structure. Interactions between individuals are seen as basic elements for social relationships. Relationships are the basis for group structure. Description of an interaction requires specification of the content, that is, what individuals are doing together; e.g., A does X to B and B responds with
YJ and the quality of an interaction. An essential aspect of the quality of an interaction is its valance. Whether an interaction is positive/pro-social or negative/anti-social is an important determinant of meaning of an interaction for a relationship. However, existing relationships also affect the quality of specific interaction. Relationship involves a succession of interactions between two individuals. Description of a relationship requires specification of the content and quality of the interactions as well as their patterns with respect to each other and overtime mutual friendship (Hartup, 1992) and a bully/victim relationship (Olweus, 1991) are examples of influential type of relationship in school classes. However, numerous spontaneous and organized, short and long-term relationships may be distinguished in a class group. They may concern curricular activities, such as peer teaching, as well as extracurricular domains.

The peer system in a class doesn’t operate in a vacuum. Children in a class also interact with teachers. Different compositions of school classes in secondary schools may result in shifting peer systems. Furthermore, children participate in relationships and groups outside school. Finally, children have their longest and most influential relationships with their parents and siblings at home. All these relationships, especially the latter, affect children’s peer interactions and relationships in class.

The quality of children’s peer behaviour is reflected by peer competence. Peer competence can be defined as children’s ability to affect interpersonal outcomes or goals, taking into account the frame of reference of other peer group members (Renshaw & Asher, 1982). In
positive or pro-social interactions children are able to take into account their partners or even at the cost of their partners’ interest. The first are instances of pro-social behavior, the second of aggression. Peer competence reflects several different component capacities, such as social encoding and information-processing skills, social interactive skills, affective responding and children’s social motives. During sequences of social interactions these capacities are used over and over very rapidly in real time and often at a non-conscious level (Dodge, 1986). Deficiencies in peer competence may result from deficiencies in each of these component capacities.

2.3.3 Assessment

Relationship and group structure in peer groups are mostly assessed using sociometric procedures; group members evaluate each other on one or more criteria, resulting in received scores for each group member on each criterion. Since the early 1980s two-dimensional sociometric models have been used for classification of group members in five sociometric status groups: popular, rejected, neglected, controversial and average sociometric status.

First, the number of 'most liked' and 'least liked' nominations each child in a group receives are used to derive scores for acceptance and rejection. Second, two independent dimensions are constructed: social impact, as the sum of acceptance plus rejection nominations and social preference as the result of acceptance minus rejection nominations. Social impact or social visibility is a measure of social salience or the relative degree that children are noticed by their peers,
either as liked or disliked by their peers. Third, children are assigned to sociometric groups. Popular children have high acceptance and low rejection scores, rejected children have high rejection and low acceptance scores, neglected children have low impact, and controversial children have high impact scores. Other children have an average status: they have intermediate scores on acceptance and rejection as well as on social preference and social impact. Two different procedures are used: the standard score model is based on standardized scores (Coie, 1982) and probability model is based on binomial probability theory (Newcomb & Bukowski, 1983). Both methods have highly similar psychometric performance characteristics and result in convergent classifications. Both methods tend to identify about 15 percent popular, 15 percent rejected, 10 percent neglected, Five percent controversial and 55 percent average children. These percentages may vary from group to group depending on group composition and group atmosphere.

Assessment of peer competence can be derived from several sources, such as self and peer evaluations, parent or teacher judgments, observation of the children’s interactive behavior, assessments of children’s social cognition and so on. These assessments are typically related with correlations between 0.30 and 0.40. There are several reasons for such moderate interrelations (Newcomb, 1993). First, the accessibility of each of these informants’ sources to peer relations varied. Second, the informants’ sources are constrained by potential cognitive biases and limitations. Third, the nature of relationship with a child leads to different interests in evaluating children’s peer
behaviour. Therefore, depending on assessment purposes specific information has to be used or different perspectives from several informants have to be considered.

2.3.4 Socio Metric Status, Peer Competence, and Developmental Pathways

In a meta-analysis of 41 studies Newcomb, 1993 investigated socio-metric group differences on several aspects of aggression, sociability, withdrawal, and academic/intellectual ability. Information was moderately consistent over four different sources: Observation, peer, adult, and self-reports. Popular children are most liked by peers and best friends, and show higher levels of sociability and cognitive abilities and lower levels of aggression and withdrawal. They have the social abilities to achieve interpersonal goals and to maintain positive relationships. Popular children’s behavioural repertoire primarily leads to positive social outcomes for themselves and for others. Rejected children provide a nearly polar opposite to the behaviour patterns of popular children. They are less sociable and cognitively skilled than average children. Controversial children have lack of positive qualities and rejected children are at risk in their social development.

Controversial children represent a combination of characteristics found among rejected and popular children. They compensate for their high level of aggressive behaviour with significantly better cognitive and social abilities. Neglected children also experience some adjustment difficulties. They have been exhibit less sociability. They are not more withdrawn. However, the lack of stability of the neglected status classification and the limited extent and magnitude of
behavioural problems do not make them an at-risk group. They seem to opt for a lower level of involvement in the peer group. Extensive involvement in the peer group does not seem to be a development necessity. Neglected children often have a reciprocal best friend and, in general, they have average friendship (Newcomb, 1993).

A growing number of longitudinal studies provide support for at least four developmental pathways by which early peer relations and peer competence are related to later personality development. First the behavioural report of popular children is primarily made up of socially skilled behaviours that also lead to positive social outcomes in the long run. These children sustain stable peer relationships and friendships that are mutually beneficial. Friendships provide several functions for children, involving (a) emotional resources, both for 'having fun' and adapting to stress; (b) cognitive resources both for problem-solving and knowledge acquisition; (c) context in which basic social skills are acquired and elaborated (e.g., social communication, co-operation, and group entry skills); and (d) forerunners of subsequent relationship (Hartup, 1983). Social skills and friendships that protect popular children against social-emotional adjustment problems are similarly beneficial for the majority of average and neglected children. There are no data for the small group of controversial children to indicate whether they are protected by their social and cognitive abilities. Those skills enable them to initiate group behaviour, to profit from it, and to avoid negative consequences.

The second and third pathway concern rejected children. Cilleson (1992) suggests that the rejected status group is not
homogeneous. Nearly half of the rejected children, a smaller but substantial subgroup, more often girls, show high levels of withdrawal; and a third subgroup is not very deviant from average status. Patterson (1989) suggests that in early childhood, ineffective parenting practices lead to peer rejection. In elementary school, the conduct disordered behaviours lead to academic failure, peer rejection, and low esteem. These failures lead during adolescence, to increase risk for depressive mood and involvement in a deviant peer group.

The third developmental pathway concerns children who are consistently rejected, avoided and excluded from peer interactions but who are not very aggressive. Chronic rejection, paired with high levels of withdrawal and low social and cognitive abilities may lead to feelings of loneliness and symptoms of depression.

The fourth developmental pathway concerns a mixed group of children, especially early adolescence, who as a consequence of contextual circumstances or as a result of risk-taking behaviour temporarily or for a longer period of time experience behaviour problems such as drug use, concomitant problems in school, and delinquent behavior (Loeber, 1988).

First, clearly specified socio-emotional goals outcome expectancies have to be formulated and adopted by individual teachers and teacher teams, by school authorities and eventually, by parents and class groups. Adoption of such goals by the school district facilitates availability of teacher training and guidance services in the district. Second, a long term assessment programme has to be adopted with specific screening and assessment procedures involving multiple
information sources such as teacher, peer, and parental evaluations and self-reports. Initial assessments estimate the extent of peer problems; later assessments control maintenance of improvement may have a preventive signaling function for individual children. Third, treatments should involve individual children, their parents, the class group and the parents as a group. Treatment should be directed at separate interactions, enhance peer and teacher-child relationships, and support the class group structure. Programmes should be supported by the school and continue over children’s school career. Fourth, teachers should be given training in appropriate effective child and class group management skills and be able to communicate openly and effectively with individual parents and parents as a group. Fifth, Programme have to be based on three components of social support; (a) nurturing and warm working relations and avoidance of hostility; (b) co-regulations of behaviour, that is, clear rules and limit setting balanced with respect for autonomy; and (c) open communication and avoidance of misleading information. Warm working relations and avoidance of hostility have to be fostered among children in class, between teachers and children, between teachers and parents, and within teacher team (Elton Report, 1989).

Clear and acceptable rules and limits to unacceptable behaviour are paired with respect for autonomy, and fostering self-control, that is self-goal setting, self-monitory, and self-reinforcement for individual children as well as group control in terms of group goal setting, group monitory, and group reinforcement for the class. Working relations and responsibilities for parents, teachers and schools should be clearly
defined and mutually supporting, open communication and avoidance of misleading information should be maintained within the team, between teachers and children and the peer class, and with individual parents and parents as a group (Olweus, 1991).

2.3.5 Peer Relations and Learning

Children’s communication with their peers has qualities that differ from the qualities of adult-child communication. Peer dialogues are usually more equal than conversations between adult and child: children usually listen more respectfully to adults than to peers for information and guidance. Such differences have serious implications for learning. Educators have become aware of these differences and have begun to design classroom strategies that best exploit the learning opportunities provided by both peer and adult-child relations.

2.3.6 Special Features of Peer Communication

In his work on moral judgment, Piaget introduced the notion that children live within “two social worlds” one of unilateral adult-child commands, the other of mutual peer co-operation (Piaget, 1932). Developmental psychologists have elaborated this distinction further (Hartup, 1983; Youniss, 1980). Whereas adult-child interactions reflect a fundamental asymmetry of power and knowledge, peers interact on an equal footing. This means that adult usually direct and structures the agenda in their conversations with children, whereas children negotiate and 'co-construct' the agendas of their peer encounters.
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The asymmetry of adult-child interactions creates a context for learning with many advantages: it provides the best available means of transmitting the culture’s accumulated store of knowledge and respect for existing order of things (Youniss, 1980). This unilateral respect, however, may lead to certain cognitive imbalances, such as an uncritical acceptance of the adult work and an over reliance on imitations in the attempt to acquire new skills. Peer relations, in contrast, encourage children to try out new ideas in a relatively supportive and uncritical environment. They create a context for sharing intimate thoughts, for engaging in close collaborative work, for questioning the known, and for attempting the unknown. In terms of their value for children’s learning, peer relations offer a context for support and discovery but are not as useful as a forum for imparting basic information, formulas, or skills (Damon & Phelps, 1989).

2.3.7 Forms of Peer Learning

Although peer relations are generally more equal than adult-child relations, not all peer engagements are strictly alike. Peer relations themselves can be unequal to various extents. There are three main types of peer learning that have been introduced into classrooms by educational researchers. These have been called Peer tutoring, Cooperative learning and Peer collaboration (Damon & Phelps, 1989). As in the contrast between adult-child and peer relations, the three distinct forms of peer learning offer different strengths and weaknesses for the educator.
2.3.7(a) Co-operative Learning

This team-based learning technique varies in approach but usually employ assigned roles and heterogeneous grouping. A variety of views exist about the role of competitiveness, reward structures, role assignment, and division of labour. Damon and Phelps (1988) argue that co-operative learning techniques are high on equality yet low in mutuality. In traditional co-operative learning, depending on the strategy used, students often work on separate tasks and bring their results back to the group. This low mutuality is evident in the popular co-operative learning strategy JIGSAW (Aronson, 1978), where students become experts in one small area and bring their ideas to the rest of the group. Even when using heterogeneous grouping, co-operative learning models are high in equality because of the relative knowledge levels of the group members.

Co-operative learning also called 'small group learning' or 'group work', has been introduced into many schools because the available methods are relatively easy for teachers to adopt. The techniques can be integrated into the normal school day without disruptions in the regular classroom routine. Some cooperative learning programmers require as little as an hour or two a week of classroom time. There are a variety of co-operative learning techniques now in use. All begin by dividing classroom into 'small teams' of no more than four or five children. These teams are generally heterogeneous with respect to student’s abilities. The teacher presents a task to the team, and the team sets out to master it. All co-operative learning methods rely on team solidarity and the motivation that it engenders. The assumption is that
students will work for the success of their fellow team members and the team as a whole (Kennedy, 1993).

Some widely adopted versions of co-operative learning are Aronson’s 'Jigsaw teaching', Sheran’s 'Group Investigation', and Slavin’s 'Student teams achievement divisions' (Slavin, 1987). In Jigsaw teaching, each member of a student team becomes an expert on one aspect of a larger topic. After studying that aspect in depth, the expert reports back to the team on what he or she has found. The team as a whole is taught by each 'specialist' member in turn. In Sharan’s method, team members plan and assign themselves specialized roles and prepare detailed reports for each otheredification. Group discussion of the report is encouraged. Salvin’s method establishes competition between opposing teams. It encourages team members to share work and information with one another so that they will perform individually better than members of other teams on quizzes derived from the learning experiences. Co-operative learning methods vary in the extent to which they encourage individual versus collective activity in the learning groups. In Jigsaw version, team members assume different roles while they are learning about the task. Only then the team members share the results of their individual work with the rest of team (Salvin, 1990). In Salvin’s version, the team works together to prepare for individual tests or performances that will be given later. Some versions, in contrast, encourage joint planning and discussion throughout the exercise. Co-operative learning methods also vary in the extent to which they rely on competition between teams as a motivator. Many techniques extrinsically reward strong team performances in
order to spur children’s interest in the tasks. Rewards are usually allocated on the basis of scores on tests given after the exercise. The explicit message to the team is that they will jointly benefit by beating other teams only if they ensure that all team members master the task. Other cooperative learning approaches spurn this competitive component and rely on intrinsic motivation to engage the learning groups in the exercise.

2.3.7(b) Peer Tutoring

In this method, one child, usually more advanced, instructs the less advanced student as he/she works on a task. In contrast with adult-child interaction, the peer tutor is not an authority figure and possesses fewer skills than an adult tutor. Damon (1984) maintains that peer tutoring is low in equality and varied in level of mutuality. Equality, the relative knowledge levels of the subjects involved, is high if all group members possess a similar knowledge framework. Mutuality, (the common goals of the subject, is high if all group members are working together on the same task. In peer tutoring, equality is low because tutors possess more skills. Mutuality may vary depending on task. The task structure may be such that the peer tutor simply assists the less advanced student or the tutor may actually be deeply engaged in the task.

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 often called 'cross-age' tutoring since the tutor is usually two or more years older than tutee.

Peer tutoring occupies an 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 person who is 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 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 free to express opinions, ask questions, and risk untested solutions. The interaction between instructor and pupils is more balanced and more live when the tutor is a peer (Damon & Phelps, 1989).

A theoretical grounding for peer tutoring can be found in (Vygotsky, 1978) idea of the 'Zone of proximal development'. Vygotsky wrote that problem-solving in collaboration with more capable peers could enable children to enter into new areas of potential.
These new areas, which Vygotsky called the 'leading edge' of children’s intellectual growth, constitute the Zone of proximal development: 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 reproduce these jointly produced intellectual performances autonomously. When this happens, the 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 internalized, but also fundamental cognitive processes that are implicit in the communications. Accordingly, both parties in the communication stand to benefit. The tutee profits from the very acts of questioning, challenging, and providing feedback to the tutor. The tutor from the act of reformulating knowledge for transmitting to the tutee, from answering the tutee’s questions, and from responding to the tutees challenges. This is what is meant by the old axiom that one never really knows a subject until one tries to teach it.

When two children enter into a peer tutoring relationship, they become exposed to new patterns of thought. This is because any peer dialogue is a co-operative, consensual and no authorization exchange of ideas. As such, it relies on rationality for its maintenance and emulates several key features of critical thinking. In particular beliefs
must be justified and verified rather than merely asserted by force of mandate. This requires significant intellectual efforts for both parties. It calls for skill in symbolically representing ideas as well as the ability to notice and resolve logical contradictions. These are central areas of cognitive competence, areas in which children at all levels and age have time for improvement. Of the three types of peer learning it was peer tutoring that first made 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 programmes, 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.

2.3.7(c) Peer Collaboration

In this technique, students at similar ability levels work together on tasks that are too difficult to solve alone. All the group members are
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treated as equals and they all work together toward a common goal. Damon and Phelps state, "This creates an engagement rich in mutual discovery, reciprocal feedback, and frequent sharing of ideas". They claim that peer collaboration is high in equality and high in mutuality because it "...encourages children’s active involvement in reasoning, problem solving, and the social exchange of ideas". According to them, peer collaboration entrances learning in areas that demand conceptual learning. Tasks that require lower levels of cognition are not substantially affected by peer collaboration. It is similar to the Group Investigation (GI) strategy developed by Sharan and Shachar (1988). Co-operative strategy, where students jointly plan and carry out an investigation, derive conclusions from their results, and present their results to the rest of the class.

In peer collaboration, a pair of novices works together to solve difficult tasks. This method differs from peer tutoring because the children begin at roughly the same levels of competence. It also differs from co-operative learning, because children work jointly on the same problem rather than individually on separate components of the problem. In actual practice, however, peer collaboration bears some resemblance to other types of peer learning. Even in peer collaboration, one child may assume the lead spontaneously; and the collaborators may separate for independent work. Peer collaboration encourages children to communicate about strategies and solutions. It stimulates the challenge of discovery learning, but places this challenge in a context of peer assistance and support. Like discovery learning, its promise lies in provoking deep conceptual insights and basic
developmental shifts on the part of its participants. This is because it encourages experimentation with new and untested ideas and demands a critical reexamination of old assumptions. However, unlike discovery learning done alone, the child does not feel like an isolated incompetent. Rather, peer collaboration provides a sympathetic forum for the creative risk taking that discovery learning can provoke the child works with a fellow novice, the insufficiencies in his or her own knowledge become less discouraging and the unknown becomes less forbidding.

As an educational intervention method, peer collaboration originally emerged from Piagetian studies in Europe and United States. The studies focused on special and physical conversations, notions that proven resistant to training through standard instructional techniques. Among the innovative experimental methods that develop mentalists tried was asking children to work jointly with peers. The strategy of placing novices together on a difficult task and expecting them to come up with a productive approach initially seemed so odd that articles has such title as "When two wrong make a right"(Ames & Murray, 1982). But peer collaboration proved to the most consistently effective means of helping children acquire conversation and the basic reasoning skills underlying it.

The dominant rationale for the strategy of teaching novices together has been the Genevan construct of 'socio-cognitive conflict' (Doise & Mugny, 1984). The idea is that social interactions between peer will lead to interactions between peers will lead to disagreements that present the participants with both a social and a cognitive conflict.
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Such conflicts lead children to a number of important realizations. First, they become aware that there are points of view other than their own. Second, they re-examine their own points of view and re-assess their validity. Third, they learn that they must justify their own opinions and communicate them thoroughly if offers are to accept them as valid.

In this way, children benefit both cognitively and socially from peer collaboration. The social benefits include their improved communication skills and their sharper sense of other person’s perspectives. The cognitive benefits derive from their forced re-examination of their own conception under the guidance of a peer’s feedback. Piaget believed that these social and cognitive benefits were directly related in that improved social communication instigates progressive change. When people feel the need to explain and justify their beliefs to others, they realized that these beliefs must be rationalized as fully as possible. This sense of ‘social responsibility’ in communication ultimately leads to improvements in the logical quality of one’s reasoning. The Genevan explanation of peer collaboration, therefore, process a clash of ideas that triggers a need to re-examine, re-work and justify ones understanding of the world. Some questions have been raised about whether the notion of conflict alone is sufficient to account for the learning that follows from experiences of peer collaboration. There is increasing theoretical emphasis on the constructive or “constructive” aspects of peer collaboration. In this view, children learn through peer interaction because it introduces them to the possibilities of co-operative activity [Youniss, (1980);
Krappman, (1992)]. In a truly co-operative effort, children devise plans together, share ideas and mutually validate one another’s initiatives. Not only is this a powerful procedure for generating new insights, it also yield solutions that are superior to those arrived at by an individual in isolation (Damon & Phelps, 1989; Krappman, 1992).

Unfortunately there have been very few studies that have attempted to identify the peer interaction process leading to progressive change. This requires lengthy and complex videotape analysis of the sort not always available in experimental studies. The initial studies favour the co-construction process model over the socio-cognitive conflict model.

In these initial studies, children who disagree with one another the most seem the least likely to progress, whereas children who accept one another’s views and work positively with them are the most likely to change (Damon & Killen, 1982; Damon & Phelps, 1989). Constructive rather than confliction interaction was clearly the key facilitator. Another analysis of children’s peer interactions during task engagement found such interactions to be heavily loaded with 'transitive' activity (Kurger & Tomasello, 1986). Such activity is a constructive and compromising form of social discourse especially suited for joint exploration into unknown areas of thought.

Finally, a study of children’s helping behaviour with peers found that peer interactions indeed can provide a unique context for learning many important intellectual skills, provided that such interactions are well balanced and mutual. Thus it is concluded: "These collaborative efforts of peers, mostly friends, presented almost the only situations in
which we found the capacities that the educational system promises to promote - exploration of different aspects of a problem, change of perspectives, experimentation with ideas, reconstruction of failed processes, analysis of mistakes, verification of the indubitable, search for criteria of good solutions co-constructively developed and jointly applied" (Krappman, 1992).

Despite its promise, peer collaboration has been used less frequently in educational programmes than have the other two forms of peer learning. This is probably because peer collaboration as a technique has its roots in experimental developmental psychology rather than in educational research. As yet there are no systematic curricula designed around principles of peer collaboration. Still, some promising initial attempts have been made to apply techniques from developmental research on peer relations to actual educational settings, (Damon & Phelps, 1989; Krappman, 1992).

2.3.8 Types of Peer Tutoring

Peer tutoring is not one defined procedure that fits all learning situations. According to Miller et al. (1994), the most widely used formats of peer tutoring are: class-wide, cross-age, small group, one-to-one, and home-based tutoring.

2.3.8(a) Class-wide Peer Tutoring

Class-wide peer tutoring involves the entire class simultaneously participating in tutoring dyads. It can be used to teach skills across a wide range of subject areas, ability and age levels. Class-wide tutoring requires great amount of teacher’s time to plan, to prepare the
programme, and to train students as tutors (Miller et al., 1994). Each student can become the tutor or tutee in the same session. A lot of work is produced; this work needs more time from the teacher to monitor and evaluate.

2.3.8(b) Cross-Age Peer Tutoring

Cross-age tutoring occurs when an older student is matched with a younger student to deliver instruction. An age difference of two or more years usually delineates the roles. An advantage of cross-age tutoring is that tutors often require fewer training sessions because they bring skills and experience to the tutoring programme. On the other hand, it lacks flexibility due to the need to coordinate schedules (Miller et al., 1994).

2.3.8(c) Small Group Tutoring

In small group tutoring, only a part of the class participates in the procedure where others may continue their regular work. Two procedural variations are possible within small-group tutoring:

1. The sessions can be conducted with select students who need additional practice with skills.
2. The whole class can participate in the tutoring on a rotating basis. While the teacher works with one group, a second group participates in peer tutoring. It has the flexibility of scheduling, but the teacher will typically not be available to monitor the tutoring sessions, to guide, and to evaluate because he or she will be instructing other students (Miller et al., 1994).
2.3.8(d) One-to-One Peer Tutoring

In this method students are paired with select tutors, who may be highly skilled peers or who are also in need of remedial work. Each member of the dyad may receive and provide tutoring in the same content area, or tutors can provide instruction in a content area in which they are highly skilled. One-to-one tutoring provides specificity of the tutoring, allows flexibility in scheduling, and it can apply to a variety of subject areas. The time needed to train tutors individually and monitor the tutoring sessions is enormous, particularly if tutors are less skilled (Miller et al., 1994).

2.3.8(e) Home-Based Tutoring

Home-based tutoring programme use the parent, the brother, the sister, or any other qualified person as the tutor. The extra practice provided by home-based tutoring can:

1. Help slower learners 'catch up' with their classmates.
2. Make the average and above-average learners advance at a more rapid pace (Miller et al., 1994).

In general, involving parents formally in the educational process enhances learning. However, not all parents can or should tutor their child at home. Some parents may be too anxious or have limited time or skills to teach their children (Miller et al., 1994). Types of peer tutoring namely - Class-wide, cross-age, small group, one-to-one and home-based tutoring can be practiced usefully. However, the most effective type is one-to-one tutoring. Although training and preparing the tutor needs a lot of time in the one-to-one model, this type provides
the teacher with a great opportunity to follow up the tutor and tutee in order to guide and enhance the process on the long run. Another advantage for one-to-one tutoring, not present in other types of peer tutoring, is the nature of the personal relationship between the tutor and tutee that arises from their continuous contact; this relationship provides more encouraging outcomes.

Peer tutoring is found in many forms within higher education. Goldschmid and Goldschmid (1976) offer a substantial review of some of them and he summarizes four basic types of peer teaching at undergraduate level.

(a) Surrogate teaching;
(b) Proctoring;
(c) Co-tutoring;
(d) Teacherless groups;

2.3.8(f) Surrogate Teaching

This involves the delegation of responsibility to selected students (often Ph.D students) of some of the teaching functions normally carried out by academic staff, i.e., marking and grading, laboratory instruction, leading small-group discussion, and in a few cases, large-class teaching.

2.3.8(g) Proctoring

In these programs, students take on the role of individual (one-to-one) tutors for fellow students who are at a similar or slightly lower stage in a course.
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A special form of peer tutoring 'Proctoring' has been widely used in American universities and colleges (and to some extent within U.K). Proctoring is associated with the personalised systems of introduction (PSI) which was developed by Keller (Keller & Sherman, 1974). PSI differs from conventional teaching in at least five ways. PSI courses are:

(a) Mastery-oriented;
(b) Student-proctored;
(c) Self-paced;
(d) Use printed study-guides to direct student’s learning; and
(e) Employ occasional lectures to stimulate and motivate the students.

The work is usually divided into topics or units. At the start of unit the students receive printed guides to direct their work. They then complete the work at their own pace, (with the help of the proctors if necessary). Before taking a mastery test on the unit and, on successful completion, move on to the next topic. The proctors are students who have demonstrated their mastery of the appropriate course material, i.e., an older student. They help other students to follow each unit of study by answering and asking questions about the work. They are also frequently employed to administer and grade the mastery-tests and give feedback. In addition to tutoring proctors have a responsibility for providing feedback to the course instructor on the general progress of students and on the reactions of students to the specific courses, materials and procedures.
2.3.8(h) Co-tutoring (or Reciprocal Tutoring)

Much informal co-tutoring takes place within higher education establishments between pairs of students encountering difficulties in understanding lectures or set tests (Goldschmid, 1986). Many institutions recognizing the benefits to students of mutual learning, have formalized this type of relationship so that all students have opportunity to engage in shared learning.

The benefits of co-tutoring were recognized by Goldschmid who examined the idea of the 'learning cell' (Goldschmid, 1970a, 1970b), in which pairs of students tutor one another. Students prepare themselves for the tutoring by reading assigned material and producing a list of questions. During the formal teaching periods students are randomly paired in ‘cells’ and then alternately ask, answer and comment upon each other’s questions. A lecturer or teacher is available in the class as a consultant to give advice on subject-matter and tutoring techniques. Schermerhorn et al. (1976) has shown this technique to be successful with high school students as well as with university students. In a comparative study to look at the effect of the learning cell on tutoring in understanding of probability with both undergraduate and high school students, they found that although students learned from preparing assignments themselves, their understanding further improved after the peer interaction component. The discussion with a peer made a positive contribution to the learning process.

2.3.8(i) Teacherless Groups

Further variations of peer tutoring in tutoring higher education take place in peer-led discussion groups which meet in the
absence of a teacher. The aim of these is to multivariate students to become more involved with their own learning, so that they become more active and self-directed in their work. Typically a discussion group has between four and eight members, the teacher assigns questions together with reading reference prior to a meeting, and the group will then discuss these during the next class period, sometimes concluding the work with a summary report.

2.4 THEORIES BEHIND PEER TUTORING

[Analysis of the following theories helps in conceptualizing the process of peer tutoring].

2.4.1 Piaget’s Theory of Peer Learning

Piaget’s theory is based on the development of mental structures. He believed that age did not matter but that it was experience that was important. From birth, we are constantly constructing cognitive structures. Even babies learn co-ordination of their physical movements by practicing them. Piaget divided learning into the following four stages: 1. Sensory motor, 2. Pre-operational, 3. Concrete operational & 4. Formal operational. Furthermore, he talks about five mechanisms of development. These mechanisms help us to proceed from one stage of development to the next one. These are: (1) Maturation (body changes), (2) Physical experience (the body’s interaction with the environment), (3) Logical mathematical experience (deductible reason), (4) Social experience (learning through human interaction) and (5) Equilibration (a balance seeking process).
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At all stages the learner is believed to be interacting with the environment. Piaget believed that the learner should be active in the learning process, opposed to being just a passive receiver of information. Peer tutoring when used as a teaching technique, can help children to be more active in the learning process. When there are many students in a class and the teacher has a lot of material to cover, the teacher might just want to get the information from the student without creating an active learning environment. This can be seen more frequently now because of the introduction of examination system. This adds more pressure on the teachers to just rush through the syllabus. When students go to a tutor, the tutor can give them personally tailored examples that add meaning to the material being studied. It is important to Piaget that students not be given a formula but through the process of discovery they come to it. Sometimes during class, there is just not enough time for this to happen but this can occur during tutoring. Once someone experiences something it adds meaning to learning. Teachers need to help and guide peer tutors to focus on helping tutees acquire experience, and not to necessarily give them answers (Grabe & Grabe, 1996).

2.4.1.1 Piagetian Cognitive Conflict Peer Learning

Piaget’s theories of collaborative learning stem from the theories of equilibration. In this learning model there has to be reconciliation between prior and newly experienced beliefs. The new one needs to be closed enough to the existing belief that the learner can relate it to previous learning. Peer learning is productive so long as beliefs differ and tasks are structured to draw out the conflict between the existing
and new belief (Foot & Howe, 1998). This leads to the existing cognitive structure being displaced and a new structure taking its place. The role of peer interaction in this instance would be to instruct, tutor and lead learners towards internal cognitive development (Foot et al., 1986).

De Lisi and Golbeck (1999) presented a model of how Piagetian principles of peer learning promoted cognitive growth. Cognitive growth was facilitated within the operational cognitive system (i.e., that which controls thinking processes as opposed to the sensory-motor system which controls motor response to stimulus). Hypotheses developed within the operational system are tested with a peer learner. The event may lead to assimilation (the child allowing the event to enter the cognitive structure in order to infer meaning). In turn this leads to accommodation where the cognitive structure is influenced by the event. However, the accommodation does not imply long term change at this point. Retaining the 'correct' cognitive structure over time is a more complex process and relies on the child gaining deeper understanding of the new cognitive structure leading to equilibration (successful modification of the cognitive structure). This results in one of three outcomes. Either the new cognitive model does not manifest itself as different from the existing model (the existing model is therefore reinforced). If 'perturbation' exists between new and old cognitive structures then the child will go through a process of perturbation-regulation compensation sequences.

This may result in the child rejecting the new model and returning to the old model. However, it may also result in the
perturbation impelling change in the child’s cognitive/conceptual systems and the development of a new cognitive structure. This process is summarised in Figure 1.

Piagetian peer learning techniques have been successfully implemented in schools in Literature, Mathematics and Science (Webb, 1989; Howeet al., 1995; Robinson et al., 2005). Central to understanding why Piagetian peer tutoring should result in cognitive restructuring are the ideas of cognitive challenge and post-interactive reflections. Peer tutors offer more possibility of congruence between cognitive
structures (therefore more likelihood of understanding the difficulties the learner may experience). This is reported to allow peers to engage in effective dialogue (Allen, 1976; Bruner, 1985).

Therefore, peer learning contexts can provide the right balance between the disequilibrium caused through cognitive challenge and social exchanges between peers, for effective learning to take place (Palinscar, 1998).

2.4.1.2 Implications of Piagetian Theory for Peer Learning

Peer instruction can be easily related to the Piagetian cognitive learning theory which can deliver clear basis of peer tutoring (Lisi, 1999); Piaget wanted to explain the acquisition of logical scientific thinking. Peer interactions can promote advancement in performance on Piagetian assessments and can support cognitive change (Lisi, 1999). The following are principles for peer learning from Piaget’s Theory:

1. Individuals form peer learning groups or dyads. These individuals each make meaning, discover problems, and resolve problems within their individual minds.

2. Peer learning and interaction encourage an intellectual growth that cannot be provided when the learner works alone or with adults.

3. The cognitive system of the students influences their ability to work cooperatively and to understand the content.
4. Peers tend to copy from each other, so the success in doing something comes before grasping its concept.

5. The work of students together causes perturbations in their cognitive systems.

These perturbations are important to provoke changes in these systems (Lisi, 1999). Peer tutoring is an instructional method that clearly goes under the umbrella of the cognitive learning theory. Regardless of the different types of peer tutoring used, they all promote critical thinking and offer an opportunity for intellectual growth.

2.4.2 Vygotsky’s Social Development Theory

Vygotsky is best known for being an educational psychologist with a socio-cultural theory. This theory suggests that social interaction leads to continuous step-by-step changes in children’s thoughts and behaviours (Woolfolk, 1998). Basically Vygotsky’s theory suggests that development depends on interaction with people and the tools that the culture provides help to form their own view of the world. There are three ways a cultural tool can be passed from one individual to another. The first one is imitative learning, where one person tries to imitate or copy another. The second way is by instructed learning which involves remembering the instructions of the teacher and then using these instructions to self-regulate. The final way that cultural tools are passed to others is through collaborative learning, which involves a group of peers who strive to understand each other and work together to learn a specific skill.
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His theory combines the social environment and cognition. Children will acquire the ways of thinking and behaving that make up a culture by interacting with a more knowledgeable person. Vygotsky believed that social interaction will lead to ongoing changes in a child’s thought and behaviour. These thoughts and behaviours would vary between cultures (Berk, 1994).

"The main activity of all human beings consists in giving meanings to its meetings with the world" (Bruner, 1960). This sentence of Jerome Bruner summarizes the project of Lev Vygotsky: to put more emphasis on the importance of cultural and social interaction in the evolutionary process. Vygotsky considered cognitive developments as a result of a dialectical process, where the child (Vygotsky, 1962) learns through shared problem solving experiences.

Like Odell (Odell et al., 2002), we consider that an agent’s environment consists not only of an agent itself, but also those principles and processes under which the agents exist and communicate to someone else, such as parents, teachers, siblings etc. At the beginning, the person who interacts with the child undertakes most of the responsibility for guiding the problem solving, but gradually this responsibility is assumed by the child. Although these interactions can take many forms, Vygotsky focuses on language dialogues. It is primarily through their speech that adults are assumed to transmit to children the core of knowledge existing in their culture. In his learning process, the child develops his own way of communication as a primary tool for his intellectual development. So, children have a means to control their own behaviour in such a way their parents did it.
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This transition reflects the Vygotskian idea on the development as an internalisation process of knowledge and way of thinking are exogenous concept related to children and endogenous concepts related to the cultural environment. Development consists of gradual internalization, primarily through language, to form cultural adaptation. Vygotsky (1962) argues that language plays an important role in development. It develops indeed not only the intelligence of the individual but also all the whole learning process as the result of his communication and his collaboration with the others. The work undertaken by Vygotsky provides powerful foundation for social learning in any phases.

2.4.2.1 Basic Principles Underlying the Vygotskian Framework

The following points outline the core principles of Vygotsky’s socio-cultural theory of development.

1. Children construct their own knowledge.
2. Development cannot be separated from its social context.
3. Learning can lead development.
4. Language plays a central role in mental development.

This is the most common among pre-scholars who have not yet learned proper social skills but rather explore the idea of it. Children often use private speech when a task becomes too difficult and the child doesn’t know how to proceed. Private speech helps the child development accomplish a task. Vygotsky believed private speech changes with age, by becoming softer or being just a whisper.
The most important element in the socio-cultural theory is the Zone of Proximal Development (ZPD). Vygotsky believed that any pedagogy creates learning processes that lead to development and this sequence results in zones of proximal development, it is the concept that a child accomplishes a task that he/she cannot do alone, with the help from a more skilled person. Vygotsky also described the ZPD as the difference between the actual development level as determined by individual problem solving and the level of potential development as determined through problem solving under adult guidance or collaboration with more knowledgeable peers. The result of this process is children become more socialized in the dominant culture and it induces cognitive development (Moll, 1994).

In order for the ZPD to be such a success, it must contain two features. The first is called subjectivity. This term describes the process of two individuals who begin a task with different understanding and eventually arrive at a shared understanding. The second feature is scaffolding, which refers to a change in the social support over the course of a teaching session. If scaffolding is successful, a child’s mastery level of performance can change, which means that it can increase a child’s performance on a particular task.

The Zone of Proximal Development has implications for assessment, especially concerning children with learning and behaviour problems. In the book, 'Scaffolding Children’s Learning', Berk and Winsler discuss Vygotsky’s dissatisfaction with the ability and achievement tests as valid measures of children’s capacity to learn. Two children can differ substantially in the ZPD’s. One child may do
his/her best on his own, while the other needs some assistance. Therefore, the ZPD is crucial for identifying each child’s readiness to benefit from instruction.

2.4.2.2 Zone of Proximal Development (ZPD) and Scaffolding

Vygotsky describes this zone as "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peer" (Vygotsky, 1978). In other words, a student can perform a task under adult guidance or with peer collaboration that could not be achieved alone. The Zone of Proximal Development bridges between what is known and what be known. Vygotsky claimed that learning occurred in this zone. To facilitate learning in the ZPD, Wood (1976) introduces the concept of scaffolding. It was one of the ideas to give a support to learning with children. In this method, children learn best through assisted discovery. The teacher changes quality or quantity of support given to the student during the teaching session. This action completed by the teacher is known as scaffolding. Vygotsky suggested that the zone of proximal development or what can be completed with help, falls between what cannot be completed alone and what can be solved independently. As learners can become more competent, the teacher gradually withdraws the scaffolding so learners can perform tasks independently. The key is to ensure that the scaffolding keeps learners in the ZPD, which is altered as they develop capabilities. This way to conceive learning supposes that is preferable to work in a co-operative way and to encourage interactions with others for the
construction of knowledge by means of a socialization tool: the language.

Vygotsky’s ideas have been a powerful force in educational practice in his homeland - Russia, but it is only during the past decades that his works have become important for Western education (Dixon-Krauss, 1996). Jerome Bruner described his conception of human development as a theory of education (Wertsch, 1985). Vygotsky’s basic idea is that human behaviour is too complex to isolate, dissect and study in a vacuum. It must instead be studied in the social and historical context in which it occurs (Vygotsky, 1978; 1981). Thus, his approach is often regarded as socio-historical.


One aspect of Vygotsky’s theory is that activities are first carried out by children on the external plane, and then on the internal plane. He said: "Every function in the child’s cultural development appears twice or on two planes. First it appears on the social plane, and then on the psychological plane. First it appears between people as an interpsychological category, and then within the child as an intrapsychological category"(Vygotsky, 1981).

Vygotsky points that individuals are guided by their own mental processes as they participate in social activities. However, these processes are influenced by social experiences. Mental functions first begin on a social or inter-psychological plane and then move to an
inner or intra-psychological plane. He calls this process internalization. Internalization involves transforming social phenomena into psychological phenomena or making meaning through both external and internal interactions (Vygotsky, 1981). Vygotsky states: "When we speak of a process, 'external' means 'social'. Any higher mental function was external because it was social at some point before becoming an internal, truly mental function" (Vygotsky, 1981). For Vygotsky, the transformation of natural forms into higher cultural forms is one from external to the internal. As well, social reality plays a primary role in determining the nature of internal intra-psychological functioning.

All higher mental functions are internalized social relationships. Their composition, genetic structure, and means of action - in a word, their whole nature - is social. Even when we turn to mental processes, their nature remains quasi-social. In their own private sphere, human beings retain the functions of social interaction (Vygotsky, 1981). Vygotsky envisions a separate but related relationship between external social processes and internal psychological processes. According to him, external and internal processes are not copies of one another. Internalization transforms the external process into the internal, thus changing both the structure and functions of the process (Vygotsky, 1981). Wertsch (1985) identified three points that are helpful to understand Vygotsky’s concept of interaction. First, internalization is not a process of copying external reality on a pre-existing internal plane. Instead, it is a process where an internal plane of consciousness is formed. Second, the external reality is social and related to other
people. Finally, the internal plane remains 'quasi-social' because of its quasi-social nature.

Semiotic mediation is another important concept needed to understand Vygotsky. Vygotsky (1981) makes a distinction between what he terms 'lower, natural behaviour' and 'higher, cultural behaviour'. Human beings share lower biological forms of mental behaviour, such as elementary perception, memory, and attention with animals. The higher forms of human mental functions like logical memory, selective attention, decision-making and comprehension of language are products of mediated activity. Vygotsky (1986) labels the mediators of human activities as 'psychological tools' or 'signs'. These tools such as culture, language, and social context are important to human’s cognitive development. They give humans control over their mental behaviour, as well as the power to regulate and change natural forms of behaviour and cognition. Through the mediating actions of these tools, natural forms of behaviour are transformed into higher, cultural forms, unique to humans (Vygotsky, 1986). Vygotsky calls this process semiotic mediation.

Vygotsky (1981, 1986) believes that lower mental behaviours are gradually transformed into higher ones through social interaction. Vygotsky tells us there are three stages of development of speech: social or external speech, egocentric speech, and inner speech. The function of speech is at first social, used for contact and interaction with others. Vygotsky (1986) explains that the social function is the first function of speech. If we want to know how words function in an individual’s behaviour, we must take into account its former function
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in social context. Social speech carries out the task of communication and social relations with surrounding people. It is 'speech' that children use to control the behaviour of others. Children use speech to express simple thoughts and emotions such as crying, laughter and shouting.

Egocentric speech is the link between external speech and internal thought. "Egocentric speech is inner speech in its functions" (Vygotsky, 1986). Egocentric speech is a stage distinguished by external signs and external operations that are used as aids to solve internal problems. That is the stage when the child counts on his fingers, resorts to mnemonic aids, and so on. This is typically the type of speech found in a three to seven-year-old.

Inner speech is similar to internal thought. The inner, soundless speech is a stage in which the external operation turns inward and undergoes a profound change in the process. Children begin to count in their heads and to use their 'logical memory', that is, to operate with inherent relations and inner signs. This is the type of speech used by older children and adults. When functional and structural changes accumulate to a certain amount, inner speech occurs. "It branches off from the child’s external speech simultaneously with the differentiation of the social and the egocentric functions of speech, and finally that the speech structures mastered by the child become the basic structures of his thinking"(Vygotsky, 1986).

The Zone of Proximal Development (ZPD) is the most important concept among Vygotsky’s ideas. Vygotsky (1978) proposes that each child, in any domain, has an actual developmental level and a potential developmental level. The actual developmental level refers to all the
functions and activities a child can perform on his or her own - without the help from somebody else such as, a teacher, an adult or even a peer. The potential developmental level refers to all functions and activities a child can perform only with guidance and assistance of someone else. Vygotsky terms this difference between the two levels the zone of proximal development. He defines this the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers (Vygotsky, 1978). In the zone of proximal development, a teacher and a learner or an adult and a child work together on a task that the learner or the child could not perform independently because of the difficulty level. In other words, the zone of proximal development is that area where children can achieve a goal with the support and guidance of a more knowledgeable other. Vygotsky explains this concept more clearly as follows:

"The Zone of Proximal Development defines those functions that have not yet matured but are in the process of maturation, functions that will mature tomorrow but are currently in an embryonic state. These functions could be termed the 'buds' or 'flowers' of development rather than the 'fruits' of development" (Vygotsky, 1978).

A child’s actual developmental level identifies a child’s level of mental development at a particular time. It indicates the functions that have already matured in the child. A child’s ZPD defines those functions that have not matured yet, but are in the process of maturing and developing. A child’s ZPD can be used to outline the child’s
immediate future and his overall dynamic state of development (Wertsch, 1985).

In summary, Vygotsky emphasizes the significance of social and cultural context in the process of making meaning or learning with focus on guidance and assistance from more knowledgeable others. In addition, he addresses the importance of tools such as language for cognitive development.

### 2.4.2.3 How Vygotsky Impacts Learning

**Curriculum**—Since children learn much through interaction, curricula should be designed to emphasize interaction between learners and learning tasks. **Instruction**—With appropriate adult help, children can often perform tasks that they are incapable of completing on their own. **Scaffolding**—where the adult continually adjusts the level of his or her help in response to the child’s level of performance—is an effective form of teaching. Scaffolding not only produces immediate results, but also instills the skills necessary for independent problem solving in the future. **Assessment**—Assessment methods must take into account the zone of proximal development. What children can do on their own is their level of actual development and what they can do with help is their level of potential development. Two children might have the same level of actual development, but given the appropriate help from an adult, one might be able to solve many more problems than the other. Assessment methods must target both the level of actual development and the level of potential development.
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2.4.3 Comparison of Piagetian and Vygotskian Models of Peer Learning

Piaget (1978) proposed that understanding developed in children is through the processes of assimilation and accommodation, associated with the construction of internal schemas for understanding the world. This has been termed cognitive constructivism. Vygotsky (1978) placed greater emphasis on the role of social interaction, language and discourse in the development of understanding, to allow children to scaffold each other’s learning and co-construct. This has been termed social constructivism. Despite the apparent differences between Vygotskian and Piagetian peer learning theories, both require peer interaction (Blatchford, Kutnick, Baines & Galton, 2003). Although peer-peer, rather than pupil-teacher is the dominant form of interaction in the classroom (Galton, Simon & Croll, 1980; Tizzard, Blatchford, Burke, Farquhar & Plewis, 1998), teachers often fail to plan effectively for peer-peer interactions (Kutnick, Blatchford & Baines, 2002). Peer relationships can be a motivating context for pupils. In contrast to adult-peer relationships, power is distributed more horizontally and more likely to be shared (Blatchford et al., 2003). Piaget (1932) noted that 'the very nature of the relationship between child and adult places the child apart, so that his thought is isolated'.

Most students have concepts about science. These concepts can be a rich medium in which to engage in cognitive conflict or co-construction. In Vygotskian peer learning, learners will undertake joint investigations. This technique has been used successfully in primary school reading (Duran, & Monereo, 2005), Mathematics (Fantuzzo,
Davis & Ginsburg, 1995) and it is reported that in peer learning initiative with 11-12 year old pupils that the level of constructive activity was the strongest predictor of raised attainment (Webb, Troper & Fall, 1995). Fantuzzo and Ginsburg-Block (1998) reported that peer tutoring based on theories of socio cognitive development and research contributed to academic achievement. Interactions in Vygotskian peer learning contexts will be cooperative with shared questioning, splicing together of the ideas and less hinting and guiding taking place. The peers work together to generate joint understanding (Hogan & Tudge, 1999). When these patterns predominate, then peer tutoring offers greatest gains to tutees.

In Piagetian peer tutoring techniques there is more tutor direction and support. This is more aligned with the cognitive conflict outlined by Piaget. In Piagetian peer learning the adaptation of cognitive structure takes place when assimilation and accommodation are in balance. This balance should be more easily established between peers than between child /teacher resulting in cognitive structures more open to adaptation and less prone to conservation (De Lisi & Golbeck, 1999).
### Table 2.1 Similarity and Differences Between Piagetian and Vygotskian Peer Tutoring.

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Piagetian</th>
<th>Vygotskian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization</td>
<td>Takes place with same age, cross ability children. Tutors get access to the ‘problem’ they will work on with their tutee prior to the lesson and are allowed preparation time.</td>
<td>Takes place with same age, cross ability children. Tutors get access to the ‘problem’ they will work on with their tutee at the same time as the tutee and therefore, there is no prior preparation time.</td>
</tr>
<tr>
<td>Cognitive development</td>
<td>Takes place for the tutor during pre-interactive preparation. Takes place for the tutee as a result of post-interactive reflections.</td>
<td>Takes place for the tutor during the tutoring process. Takes place for both the tutor and the tutee as a result of co-construction during the interactive process.</td>
</tr>
<tr>
<td>Expected elements of discourse elements</td>
<td>Questioning and disagreement.</td>
<td>Giving of explanations and slicing together of ideas.</td>
</tr>
<tr>
<td>Meta-cognitive developments</td>
<td>Takes place for the tutor during pre-interactive preparation. Takes place for the tutee as a result of post-interactive reflections.</td>
<td>Takes place for the tutor during the tutoring process. Takes place for both the tutor and the tutee as a result of co-construction during the interactive process.</td>
</tr>
<tr>
<td>Affective development</td>
<td>Takes place prior to interaction as a result of being assigned to a tutoring role. Takes place for the tutor during pre-interactive preparation. Takes place for the tutee as a result of post-interactive reflections.</td>
<td>Takes place prior to interaction as a result of being assigned to a tutoring role. Takes place for both the tutor and the tutee as a result of tutoring process.</td>
</tr>
<tr>
<td>Characteristic elements of talk by pupils during peer tutoring</td>
<td>Exemplifying Questioning Evaluating Disagreeing</td>
<td>Exemplifying Splicing/co-constructing Hinting Leading</td>
</tr>
</tbody>
</table>
Dr Gardner focused on the following three main areas of intelligence. He based his theories on research he conducted.

1. Intelligence related to things which one can see or touch - Spatial, Logical, Mathematical, and Bodily – Kinesthetic.
2. Intelligence that which is less tangible such as language and music.
3. Intelligence that which is personal: intrapersonal and interpersonal (Briggs, 1998).

The third type of intelligence, intrapersonal and interpersonal, is one that tends to be ignored in education. However, this does affect how one learns. Schools are social environments, if a child cannot interact with others, this could lead to school not being a pleasant experience. Gardener argues that the type of intelligence we gain from personal interactions is the most basic and most fundamental type of intelligence. Traditional teaching does not address personal intelligence probably because it is not easily measurable (Briggs, 1998). Peer tutoring is an avenue that allows us to develop personal intelligence. For instance, we all have a natural tendency to associate mostly with people who look like us. This result in us being subconsciously prejudiced against people who do not look like us. When we are put in a situation where we have to learn or teach someone who is different from us, we are forced to see the person for who they really are and therefore, change the ideas we have. Personal intelligence translates to be social intelligence, which is an important part of our everyday lives.
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(Briggs, 1998). It is therefore useful for teachers who use peer tutoring as a teaching strategy in mix students up, not only according to their command of the subject matter but they should also take ethnicity into consideration. Doing this may enable students to have much more dynamic learning experiences. In schools, usually the friendship is stimulated by one of them needing help from other person or from a teacher assigning them to work together (Gardner et al., 1971).

2.4.5 Albert Bandura’s Setting Model Behaviors and Impressions of Remodeling

Bandura, believed that most of what we learn is by observing others and by repeating what they were doing. This is true because even when you watch a child playing with a doll, they will model the behaviour that their parents exert on them. If one does believe that we learn from modeling then this would explain why students turn to their peers for help. For one thing, it is easier to model something when you are being taught on a 'one on one'. Next, in advanced classes it might be difficult to model if the teacher misses stages in a problem that a student might not know, this would make it difficult to understand the solution altogether. There are four parts to modeling:

2.4.5(a) Attention- We cannot learn unless we pay attention. When a peer is tutoring you, you are forced to pay attention, especially if you sought the help.

2.4.5(b) Retention- In order to effectively model you need to remember what to model. A tutor is likely to quiz you immediately for improving your retention abilities.
2.4.5(c) **Motor Reproduction** - This is the ability to actually remodel. When working with a tutor there is more time to actually check one’s modeling abilities.

2.4.5(d) **Motivation** - encompasses praising the student for remembering material. This acts as reinforcement for the student to remember in the future.

Peers offer each other short-cuts to solve or understand information that make the work more meaningful. When students are working with their peers, they are less embarrassed about making mistakes. Tutors just by being tutors help struggling students. This is because Peer Tutoring Model study skills, such organization and work ethic. The model tutors provide is a good one for tutees to follow. Once again, peer tutoring works best when two students can both tutor each other in different subject areas. This helps both students to see that they do have something to offer and they therefore feel more validated.

### 2.4.6 Role Model Theory of Allen

The peer tutoring schemes and associated research carried out by Allen (1976) used a role-theory frame work for the conceptual analysis of tutoring. Allen, who was a social psychologist, observes that social role is a concept used to designate a set of expectations that are associated with a particular position in the social structure, such as father or mother, teacher or student. These expectations always define the rights and duties of any person who occupies the given social position. Role expectations can be specified only in relation to complementary roles: Thus, for example, the role of the teacher
consists of expectations relevant to the complementary role of student. That is to say there exist certain behaviours appropriate to the social position that an individual occupies.

According to Role theory, specific social behavior adheres to the part and not to the actor. Individuals inhabiting specific roles will feel themselves constrained by the expectations of other people to behave in particular ways. For example, if a child is temporarily given the role of teacher and put into interaction with younger children the older child’s behaviour will be constrained by the expectations of the younger children, the older child will, thereby, come to sympathize with the role of teacher and perhaps develop a deeper respect for learning. Role model theory would suggest that pupils will learn better from tutors who are their peers, or who are similar in general culture and background, than from teachers who may be perceived as belonging to an alien world. Indeed, there are indications that small-group interactions free from the teacher’s presence (even without the added dimension of tutoring) can produce beneficial results (Slavin, 1987).

2.4.7 Behaviourist Theory:

A peer tutoring scheme is informed by the theories of behaviourist psychology. In brief, they assert that learning will be efficient if every correct response to a question by a pupil is rewarded, the reward acting as a stimulus to the pupil to make another step in learning. Programmed learning strategies, such as those of BF Skinner, follow these precepts. The emphasis of tutoring schemes based on
these theories is on highly-structured systems of instruction through which the tutee is guided by a tutor who has merely to present materials in suitable order. A leading proponent of so-called 'structured tutoring' based on the precepts of behaviorist psychology is Harrison (1972) who has produced teaching materials which can be administered by people who are barely literate.

2.4.8 Socio-Linguistic Theory:

A great scholar of socio-linguistic theory, Bernstein (1964) has argued that the up-bringing children equip them with different patterns of speech and, therefore, of perception and of ability to perform well in school. Broadly speaking, working class children, he claims, learn a restricted 'code' of speech which is weak in general concepts. By contrast, middle class children acquire an 'elaborated code' which is rich in concepts and which gives them, thereby, an advantage in school. For sometimes it was thought that those brought up into a 'restricted code' were limited, unable to switch to an 'elaborated code' where as those brought up in the 'elaborated code' could switch freely between codes. Lawton (1972) showed that working class children do have the potentiality to use the 'elaborated code' but they lack practice and therefore facility. Where they have an open choice in experimental studies (in written essays, sentence completion tests, or in discussion groups) they tend to use the kind of language which is most familiar to them and seem thereby, only to be familiar with the 'restricted code'. Lawton also suggests that, if this is the case then we can be much more optimistic about the possibility of the future education- real education- of such working-class boys. It will clearly be possible, but special
techniques will be necessary - perhaps involving more teacher-individual pupil communication. This world provides yet another argument for moving away from the notion of the secondary school teacher’s task being the simultaneous instruction of 30 pupils.

2.4.9 Gestalt Theory:

Gestalt theories of psychology assert that learning will occur when the learner can locate an item in an intellectual structure or field. Either party to a tutoring arrangement, tutor or tutee, can learn by perceiving the way an individual idea relates to a context. Drawing the work of Bruner (1963), the main proponents of youth tutoring argue that children who teach other children have to struggle to make the material meaningful to the learners and thereby have the opportunity of reflecting upon their own learning process. This opportunity may increase the tutor’s awareness of the patterns of learning and consequently help them to develop their skill in seeing problems in new and different ways. The educational theories sketched thus briefly are not of course in conflict. They do however suggest that different priorities and different types of activity in peer tutoring, favoring variously either the tutor or the tutee. It is, therefore, useful to catalogue some of the benefits which different types of tutoring are designed to produce.
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2.5  PEER LEARNING IN THE SCHOOL CONTEXT

Teachers often reported that they utilized peer learning as a teaching and learning strategy in the classroom, previous work reported that this 'peer learning' often actually involved working alone or listening to teacher instruction (Tizzard, Blatchford, Burke, Farquhar & Plewis, 1988; Galton & Williamson, 1992; Galton, Hargreaves, Comber & Pell, 1999) reported that classroom observations of Mathematics lessons indicated that although children were identified as a 'working group', in practice, each child generally undertook work independently. In such learning contexts, children did not get the benefits of the social aspects of learning in a group and talk in these settings, often did not enhance learning (Galton, Gray & Ruddoc, 1999; Galton & Williamson, 1992).

An essential element of peer learning contexts is the quality of talk that takes place. Co-operation through talk enables learners to reconstruct and elaborate their ideas through peer dialogue (Bereiter, 2002) and is the primary tool for the joint construction of knowledge by teachers and learners in learning contexts (Mercer, 1996). Talk stimulates students to ascertain and resolve, for themselves, what was confusing or problematic (Brophy, 2002). Groups composed of students who gave more explanations were found to be most effective at promoting attainment in cooperative learning contexts (Slavin, 1996). Group learning contexts characterized by giving or receiving answers without explanation generally showed reduced attainment (Webb, 1989). Talk enables ideas to be jointly explored by learners to develop joint conceptions (Barnes & Todd, 1977). Therefore, it is
essential that teachers develop classrooms that establish and maintain effective pupil discourse and dialogue. Here Vygotsky’s idea can be highlighted. Vygotsky (1978) placed emphasis on the role of social interaction, language and discourse in the development of understanding. Vygotsky’s views on peer assisted learning suggested that in peer interactive contexts children could scaffold each other’s learning and engage in construction (Baines, Blatchford & Kutnick, 2003).

A number of factors influence the effectiveness of peer learning. These included the age and ability of children undertaking peer learning (Dean, 1992), the management of the classroom environment and the type of curricular task being undertaken. Science in particular, is reported to lead itself to classroom activities that can create effective contexts for undertaking peer learning (Howe, Tolmie, Duchak-Tanner & Rattray, 2000). The effectiveness of peer learning is influenced by the size and number of groups in a classroom setting. Groups that are too large often result in splintering and the beneficial effects of the group activity may be lost (Galton & Williamson, 1992). Groupings that combined high and middle, and middle and low attaining pupils in groups were reported to be most effective (Webb, 1989).

The attainment of pupils has been demonstrated to be raised through the use of peer learning contexts (Abrami, Spence, Poulsen, Chambers & D’Apolonia, 1996). Increased attainment in Mathematics as a result of adopting effective peer learning strategies have also been reported (Topping, 2002). In a survey of 804 schools, 34 % of schools reported that they utilized peer learning as a strategy to promote
increased attainment (Hallam, Ireson & Davis, 2004). Providing structure to peer learning activities was reported to have resulted in more effective group learning contexts and increased attainment in a sample of 223, 13-14 year old pupils in a study in an Australian school setting (Gillies, 2004). This study also concluded that teaching of peer learning skills to students allowed them to perform better in unstructured group settings. As a result, peer learning training for pupils promoted attainment across curriculum areas. Peer learning is therefore a technique used widely to promote attainment in pupils.

The classroom working arrangements put in place by the teacher heavily influenced the effectiveness of peer learning and the benefits that pupils may derive from the peer learning (Gerber & Kauffman, 1981). In settings where the teacher did not plan effectively and ensure that tasks required group collaboration, then the result was individualized working with little group activity (Kutnick & Rogers, 1994). The need for peer learning in schools has been identified by a number of previous studies. However, Ninnes (2002) reported that there was little opportunity for group discussion in structured science schemes of work produced by commercial publishers and it was concluded that there was a need for effective peer learning that promoted talk and prompted children to think about science curriculum related issues.

2.6 STRATEGIES OF PEER TUTORING

A traditional definition of peer tutoring might have been- "More able pupils helping less able pupils in cooperative working pairs carefully organized by a teacher". The difference in ability between the
more competent tutor and the less competent tutee implied by this definition was sometimes taken automatically to imply a difference in age also. In fact, in recent times 'cross-age' tutoring has been widely supplemented with 'same-age' peer tutoring. Furthermore, new organizational structures have been developed which dispense with the need for an ability difference in the pair. Peer tutoring is an instructional strategy that consists of student partnerships, linking high achieving students with lower achieving students or those with comparable achievement, for structured reading and math study sessions. According to Rohrbeck, Ginsburg-Block, Fantuzzo, and Miller (2003), peer tutoring is "systematic, peer-mediated teaching strategies".

There are three important strategies for peer tutoring. They are Cross-age tutoring, Peer-assisted learning and Reciprocal peer tutoring. A brief description of these strategies gives us knowledge about them.

2.6.1 Cross-Age Tutoring

Cross-Age Tutoring is a peer tutoring approach that joins students of different ages, with older students assuming the role of tutor and younger students assuming the role of tutee (Hall & Stegila, 2003). Student pairings may include a variety of combinations such as elementary students with high school students or older students with disabilities with younger students with disabilities. (Miller & Miller, 1995; Hall & Stegila, 2003). There are no stringent tutoring procedures established for Cross-Age Tutoring, however most tutors do engage in some type of training. These training sessions vary in range; some are scripted, others have few pre-set guidelines. Training sessions tend to
include a discussion of goals, problem solving strategies (academically and behaviorally) and appropriate feedback and reinforcement strategies (Barbeta & Miller, 1991). Tutors become models of appropriate behavior, organizing work, asking questions, demonstrating self-management, encouraging social interaction and facilitating better study habits (Gaustad, 1993; Cohen, 1986; Barbetta & Miller, 1991; Miller & Miller, 1995).

2.6.2 Peer-Assisted Learning Strategies (PALS)

Unlike Cross-Age Tutoring, Peer-Assisted Learning Strategies is a structured peer tutoring program. Peer-Assisted Learning Strategies was developed in 1989 by Dr. Lynn Fuchs and Dr. Doug Fuchs (2001) together with Dr. Deborah Simmons. The strategies were derived from the Fuchs’ interest in developing a peer-mediated instructional strategy that incorporated elements of other research-based methods including Class-Wide Peer Tutoring (CWPT), Classroom-Based Measurement (CBM), Co-operative integrated Reading and Composition (CIRC), and Reciprocal Teaching. Developers used these methods to enable a wider range of students to participate and increase success in school.

Peer-Assisted Learning Strategies offer specific programs in math and reading. Reading Peer-Assisted Learning Strategies is available for pre-school through 6th grade and for 9th grade through 12th grade, with variations available for some grade levels. Math Peer-Assisted Learning Strategies is available for kindergarten through 6th grade. In both content areas, the Peer-Assisted Learning Strategies are
designed to complement and not replace existing classroom reading and math curricula and instructional methods. In this structured peer tutoring program students pair of into player and coach roles to promote an equitable exchange; students exchange roles of player and coach during tutoring sessions.

The pairing of higher- and lower-achieving students is intended. So students gain knowledge from each other through practice and reinforcement (students are still within the same skill level, there is not a huge discrepancy between ability levels). Teachers must carefully describe how the Peer-Assisted Learning Strategies are done and how they relate to a particular lesson; they must closely monitor the roles taken on by each student, and interject when instruction is needed (Fuchs, Thompson, Svenson, Yen, Al Otaiba, Yang, McMaster, Prentice, Kazdan & Saenz, 2002). Math Peer-Assisted Learning Strategies can be applied to many diverse learners at varying skill levels. According to Doug and Lynn Fuchs (2001) this approach uses structured interactions between students to encourage high-level feedback while in pairs. These interactions increase the level of participation on topical areas through verbal rehearsal, until the process becomes routine. In these activities students learn that strategies can be applied to other content areas also. Students get step-by-step feedback through their interaction during tutoring sessions. The tutoring sessions are reciprocal with students taking turns as tutor and tutee.

During PALS sessions, the program developers encourage teachers to assist students in making connections between the material presented and math concepts. They indicate that with structure and
guidance from teachers, students can move past basic concepts and questions into conceptual knowledge. Methods that have enhanced conceptual math knowledge include: providing real-life examples, discussing meaning and answers to problems, and the use of manipulative or concrete representations.

2.6.3 Reciprocal Peer Tutoring (RPT)

"Reciprocal Peer Tutoring (RPT) is an intervention strategy combining self-management methods, group interdependent reward contingencies, and reciprocal peer teaching to promote academic and social competency" (Fantuzzo & Rohrbeck, 1992). Reciprocal Peer Tutoring is a collaborative learning strategy in which students alternate between the role of tutor and tutee. Unlike the previous peer tutoring strategies discussed, Reciprocal Peer Tutoring may involve more than a one-to-one relationship. Students alternate roles while in pairs or groups. Reciprocal Peer Tutoring has a structured format where "students prompt, teach, monitor, evaluate and encourage each other" (Fantuzzo, King and Heller, 1992).

Students are part of the educational process and are able to prepare instructional materials and receive feedback from peers. The alternating structure is designed to utilize group reward and interdependence to maximize learning and motivation. Group rewards are earned as all individuals in a group make progress. Students can select their rewards and goals from a list of teacher-prepared choices. Furthermore, students are accountable for monitoring and evaluating peer performance (Fantuzzo et al., 1992; Pigott, Fantuzzo & Clement,
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1986). The idea is to “increase student choice and participation in the management of their own group interdependent reward contingencies and reciprocal peer teaching methods” (Fantuzzo & Roherbeck, 1992).

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<td>Social Reinforcement &amp; Earn Points</td>
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2.7 A BASIC PEER TUTORING MODEL

Peer tutoring is most commonly used to supplement typical teacher-led instruction. We call this the basic tutoring model and examine it in this section.

The model has two phases - planning and implementation, each having four steps. These steps are summarized below.
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Steps in planning and implementing peer tutoring:

**Planning**

1. Identify a topic
2. Prepare instructional materials
3. Assign students to pairs
4. Train students to be effective tutors

**Implementation**

1. Conduct group presentation
2. Break into peer tutoring groups
3. Monitor progress
4. Evaluate tutoring pairs

2.7.1  Planning for Peer Tutoring

2.7.1(a) **Identify a Topic:** - One to one peer tutoring can be used in any subject where the topic includes convergent information with clear right and wrong answers. Organized bodies of knowledge and thinking skills with their complexity and divergence are less applicable to peer tutoring activities.

2.7.1(b) **Prepare Instructional Materials:** - Convergent topics allow the teacher to construct specific practice and feedback exercises that provide structure for the tutoring sessions. Tutors then focus on the problems and exercises in the materials. Student tutors are largely incapable of providing initial or even supplementary instruction. So these materials are critical.
2.7.1(c) Assign Students to Pairs: - One arrangement is to pair a high with a low achiever and let the more advanced student do the tutoring. A different option called reciprocal tutoring, pairs students of comparable ability, and they take turns being the tutor. In this arrangement, students usually, slide into a pattern in which they simply work together instead of one acting as tutor for a period of time and then switching.

2.7.1(d) Train Students to Effective Tutors: - Like teachers, effective tutors are made not born. The preparation both the tutors and the students being tutored receive is important in the effectiveness of the process (Slavin, 1996). Untrained tutors often imitate the worst from their teachers, including punitiveness and a lack of helpful feedback. A list of effective training components includes the following.

2.7.1(d)1 Explaining Objectives:

At the beginning of a session the tutor should provide focus by identifying the skill or concept to be learned. The teacher can help by writing the objective at the top of the work sheet.

2.7.1(d)2 Staying on Task

When an extraneous subject comes up, have the tutors remind their partners of the objective and call their attention to the number of examples, pages, or steps left to do.

2.7.1(d)3 Emotional Support

Encourage tutors to make supportive comments for incorrect answers, such as, "not quite. Let's look at it again" , "What is the first thing you did?" etc.
2.7.1(d)4 Praise and Other Positive Feedback

Discuss the importance of positive feedback and provide examples of different forms of praise (e.g., "Good answer","Great, you're really getting this"). If possible have the tutor link the praise to specific behaviors ("Good, you remembered to carry the three to the hundreds column"). At the end of the lesson, have the tutor state what was learned and relate this to the session objective.

2.7.1(d)5 Encouraging Verbalization

Instruct the tutor to encourage thinking out loud, both for himself or herself and his or her partner. This makes the cognitive operations observably, providing a model for the partner and feedback for the tutor.

2.7.2 Implementing Peer Tutoring Activities

2.7.2(a) Group Presentation:

Teach the content in the same way that you normally would. You could use one or more of the strategies, remembering that organized bodies of knowledge, are less appropriate for peer tutoring activities

2.7.2(b) Break into Peer Tutoring Groups:

Give the students the worksheets designed to reinforce the content you've just presented; specify the amount of time they have for the tutoring session, and clearly state your expectations.
2.7.2(c) Monitor Progress

Circulate around the room to answer questions and ensure that the tutoring is proceeding smoothly. To the extent possible, answer only procedural questions. Answer content questions only when the tutor is unable to do so; check the exercise sheets at the end of the session for any error patterns that might indicate areas for re-teaching.

2.7.2(d) Evaluate Tutoring Pairs:

If a tutoring pair is not functioning, rearrange the students. One of the advantages of peer tutoring is that students are exposed to different teaching styles and personalities. To take advantages of this reconstitute the tutoring pairs periodically.

2.8 OUTCOMES OF PEER TUTORING

There are several benefits for teachers, students and students being tutored, in using peer tutorial programs. Studies have been done to support the claim that many students may feel more at ease, and thus can concentrate better on the subject matter, with a peer tutor rather than a professional teacher or consultant (Ehly et al., 1980). Other studies have found that peer tutors help themselves increase their own understanding of the subject matter they tute students in/on, which boosts confidence and can carry over to their desire to learn other subjects (Ehly et al., 1980). So we can see that peer tutoring is mutually beneficial; both the student and tutor stand to gain something. And, of course, peer tutoring is also beneficial to teachers who may not have the time to spend with each of their students one-on-one.
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While peer tutoring does indeed benefit many, only the benefits reaped by students being tutored will be focused on here. And, according to Goodlad and Hirst (1989), there are four main benefits for the students or tutees when they seek out peer help: they receive individualized instruction; they receive more teaching; they (may) respond better to their peers than to their teachers; and lastly, they can obtain companionship from the students that tutor them. First case, in which they receive individual instruction, gives students a fairly obvious advantage. This benefit is rooted in Behaviorist theory, which itself is based on an assertion that learning will be effective if every correct response to a question by a student is rewarded, the reward working as an incentive for the student to take another step in learning (Goodlad et al., 1989). Also, giving each learner his or her own personal tutor can spark dialogue between student and tutor, and the student may ask the tutor questions he or she wouldn’t dare to ask in class, or spend time on things that could be crucial to a student’s understanding of the subject matter. Spending time working with just one person may discount outside perspectives, but if the tutor is familiar enough with the subject matter, the one-to-one experience can help a student immensely, and the student can learn in a low-pressure situation. The second case, in which tutees receive more teaching, also gives students being tutored with a pretty obvious advantage. Working with a tutor is usually done outside of normal class time, so spending more time on their work with someone that is familiar with what they are doing outside of class obviously means that the students get more teaching time. Peer tutorial sessions give students the chance to talk
through problems with a qualified person, whereas students may not get the chance to do this with a teacher or professor because of the many other students in the class taking up or demanding the instructor’s time. Also, interaction with a peer tutor of nearly the same age can be a big help. As Goodlad and Hirst (1989) put it, "A student only a year or two ahead can readily show a fellow student the way through a problem, indeed, often re-formulating the problem with a student at a similar stage of the course can be sufficient to promote learning".

The third case, in which students potentially respond better to their peers than to their teachers, is probably one of the most important reasons for using peer tutoring. Often, students - especially rebellious teenagers - will shun the advice of someone older, i.e., a teacher, parent or someone else they perceive as an authority figure. One way of reaching children like this is through using someone only a-year-or-two older who shares similar cultural tastes, but has also made it a point to acquire the knowledge and skills that formal schooling offers. It is here that peer tutors can make the apathetic, bored or unruly student realize that education is truly an important part of their life and something that shouldn’t be ignored in their youth.

A study conducted by two psychologists, (Feldman & Allen, 1973), found that peers are more sensitive than adult teachers to picking up on non-verbal cues of fellow students being tutored. So, a peer tutor may be able to more readily perceive difficulties a student being tutored may be having, and can then work to clear things up.
The final case, in which students being tutored can receive companionship from peer tutors, is a pretty matter-of-fact psychological rationalization. As Goodlad and Hirst say, "Just as a child feels more secure in the presence of an older person in a social situation, so the child may feel more secure when similarly guided in an intellectual one". Following this logic, Gestalt theory -- which affirms that learning occurs when the learner can locate an item in an intellectual structure or field - says that "learning will be improved if the structure or field into which Individual ideas and experiences must be placed, is simply, quickly and painlessly communicated". Peer tutoring, by its nature, does just this; it allows a student having trouble with a particular subject to work with someone who has a breadth of knowledge of the subject they tutor in, and can thus 'painlessly communicate' (we hope) to the student what needs to be done for him or her to become a full-fledged part of the academic group or community he or she wants to be involved in, and to improve the quality of his or her work.

Phelps and Damon (1989) conducted a study to assess the effects of peer work on the mathematical and spatial reasoning skills of fourth-grade students. They concluded that students working in peer groups outperformed counterparts in control groups. They state, however, that the effectiveness is somewhat task dependent. They point out that their treatment was effective in promoting deep learning of as opposed to rote learning. Phelps and Damon call for more research in this area, arguing that peer collaboration is effective in promoting conceptual change.
In a small-scale, longitudinal study of peer group collaborative problem solving, Forman (1981) demonstrated that peer interaction can help students solve cognitive tasks because individuals take different roles during the task, thereby spreading the cognitive load. Students in this study co-operatively generated ideas and strategies for testing their ideas. Based on the results of the study, Forman set forth several other factors that promote collaboration, including (a) personality of the subjects, (b) interest in the task, (c) confidence, (d) appreciation for the others’ abilities, (e) persistence and (f) innovation. The study maintains that disagreements and their resolution help in the problem-solving task.

Using the idea that relative difference in the expertise of individuals in collaborative group problem solving situations can have an impact on the ability to solve geometry tasks, Forman, Cordle, Carr and Gregorius (1991) found differences between groups of equal and unequal expertise on post-test gain scores. These researchers argued that dyads containing children who had moderately discrepant expertise levels were more effective in showing gains than were dyads based on unequal expertise levels. They contend that there is a level of 'optimal mismatch' that is required for collaborative group work to be effective. According to these researchers, heterogeneous groups based on moderately discrepant prior expertise may be more effective than widely discrepant expertise groups. Using one of the dyads from the above study, Forman (1989) described the interactions that occurred during the group problem-solving situation. He examined the subjects’ ability to justify their positions, the problem-solving roles assumed,
and the experimentation strategies during the sessions. Forman concluded that collaboration helped both subjects in decision-making accuracy and that roles emerged during collaboration that reflected their initial reasoning. Forman argues that peers of comparable ability but with slightly different approaches to solving problems can help each other by providing new strategies during problem solving. Forman interprets these results as being a bi-directional zone of proximal development where the roles of teacher and student were assumed at different times by different people.

More recently, Heller and her colleagues (Heller, Keith and Anderson, 1992) conducted studies on the effects of collaborative group problem solving in a physics classroom. These researchers found that students working in mixed ability groups were able to solve math-based physics problems at a much higher level than those same students working alone. They further contend that all members of the groups, whether high or low ability, achieved at higher levels than when they worked alone. Heller and her associates (1993) also noticed that certain groups avoided conflicts and came to problem solutions too quickly. Generally, research conducted on the effects of peer interaction on learning has yielded positive results. Some researchers argue that problem-solving ability increases during peer interaction and that the impetus for this increased ability is cognitive conflict. Of the few studies conducted on the effects of peer interaction on concept development, the results have generally been favorable; students who worked in peer groups were able to develop more consistent conceptions than their counterparts who worked alone. It should be
noted that these results came from the use of peer interaction strategies which engaged students in high levels of equality and mutuality such as is found in peer collaboration.

### 2.9 CONCLUSION

Peer tutoring or peer instruction, should not be viewed as the solution to all the academic and behavioural problems teachers face. Rather, it is a set intuitional option among a variety of teacher-led, student-regulated, and technology-assisted alternatives. Peer tutoring is an effective educational strategy for classrooms of diverse learners because it promotes academic gains as well as social enhancement. Programs can be successfully implemented at the classroom-level or on a wider scale at the school- or district-level. With administrative support and professional development, peer tutoring can help teachers cope with challenges such as limited instructional time, multiple curricular requirements, and appropriate social engagement among students. Students engage in active learning while staying abreast of the progress they are making. They are held accountable for their achievement, and motivated by social or tangible rewards. A goal of peer tutoring is to create self-managed learners with high self-esteem.

Peer tutoring is particularly advantageous in inclusive classrooms, because it allows teachers to address a wide range of learning needs and engages all students simultaneously. Regardless of ability level, students can engage in and learn from the lesson. Furthermore, the collaborative learning aspect of the strategy encourages positive social interaction between students in a classroom.
By including traditional instructional strategies along with peer tutoring, teachers can utilize the ability differences inherent in an inclusive classroom, and promote accessible and successful learning for all.