CHAPTER 2

REVIEW OF RELATED LITERATURE

2.1 Introduction

This chapter reviews the prevailing and relevant literature with the aim of gathering insights to build a sound theoretical and methodological framework for the study. Literature covering theoretical issues includes second language learning, online collaboration, online collaborative language learning, online interaction, and conclude with related studies on online collaboration in Malaysia. The methodological issues focus on the use of interaction analysis to examine knowledge construction.

2.2 Theoretical approaches to learning and second language learning

Throughout educational history, psychology has always played a vital role in providing crucial information for the design of schooling based on theory and research on human nature, learning, and development (American Psychological Association, 1993). The field of second language learning is no less influenced especially in the teaching of English as a second language (TESL).

The existing relationship between psychology and second language learning can be traced through the following distinct approaches to teaching and learning: behaviouristic, cognitive, and humanistic. The influence of these approaches on the teaching, learning and the enterprise of schooling are described below.

2.2.1 Behaviouristic approach

Behaviourists believe that learning arose out of some form of conditioning and that all human behaviour could be explained in terms of how stimulus-response (S-R) connections were made. Skinner (1953) forwarded the theory of 'operant conditioning' i.e. individuals respond to a stimulus by behaving in a particular way. The element of behaviour reinforcement plays a significant role in Skinner's theory: if a behaviour is rewarded or punished, then there is a higher or lower chance of that behaviour occurring when a subsequent situation arises. To improve learning, Skinner advocated that learning should be made explicit; tasks should be broken down into a series of small steps; there should be individualized learning programmes to encourage students to work at their own pace; and that immediate positive reinforcement should be provided (Williams & Burden, 1997).

The emphasis on behaviouristic theory in the mid-20th century spawned the structural and the audiolingual approaches to language learning. The focus of these approaches is that learners learn by "imitation, mimicry, constant practice and, finally the new language habits become fixed as those of our mother tongue" (Bell, 1981, p.24).

One of the criticisms levelled at this approach to language learning is that learners are viewed to be passive i.e. they do not personally develop strategies in their language learning. Additionally, behaviourists pay scant attention to the cognitive

processes that take place during learning because they are singularly concerned with the observable.

2.2.2 Cognitive approach

Cognitive psychology is concerned with the workings of the human mind especially the mental processes involved in learning (Brown, 1994). Cognitive psychologists view learners to be active participants in the learning process i.e. they apply strategies in their learning through information processing.

A dominant figure in this approach to learning is Piaget. One of the most enduring aspects of Piaget's work has been his emphasis on the constructive nature of the learning process. Piaget's theory premised on the belief that learners are actively involved in constructing their own personal meaning based on their prior experiences. Unlike Piaget, behaviourists view knowledge as a static entity that is to be discovered and accumulated.

The concept of cognitive structure is central to Piaget's (1928) theory. Cognitive structures are patterns of physical or mental action that underlie specific acts of intelligence and correspond to stages of child development. Piaget sees the developing mind as constantly seeking equilibrium, i.e. a balance between what is known and what is currently experienced. This is accomplished by the processes of assimilation and accommodation. Assimilation is the process by which incoming information is changed or modified in the learners' minds so that they can fit it in with what they already know. Accommodation, on the other hand, is the process by which

learners modify what they already know to take into account new information. The constant effort to adapt to the environment through assimilation and accommodation results in cognitive development.

There are a couple of central aspects of Piaget's theory that are particularly significant to second language acquisition. First, when learning a new language, learners are actively involved in making sense of the language input. Thus, it is important for teachers to help and encourage them in this process. Second, a central focus of learning is the development of thinking and its relationship to language and experience. Third, Piaget's theory of assimilation and accommodation implies that learners' knowledge of the language is reshaped as it more closely approximates to the target language.

Bruner, who is an advocate of Piaget, believes that the development of conceptual understanding and of cognitive skills and strategies is a central aim of education. Hence, he saw the importance of the need to learn how to learn, which he considered to be the key to transferring what was learned from one situation to another (Bruner, 1960). A major theme in Bruner's theory is that learning is an active process in which learners construct new ideas or concepts based on their prior knowledge. The learner selects and transforms information, constructs hypotheses and makes decisions, relying on a cognitive structure to do so. Cognitive structure (i.e. schema, mental modes) provides meaning and organization to experiences and allows the individual to go beyond the information given.

Critics note that the cognitive approach to learning, which emphasizes the individual cognitive development, has overlooked the affective aspects of the learner and the social environment for learning.

2.2.3 Humanistic approach

In contrast to the cognitive approach, the humanistic approach to learning focuses on whole-person learning whereby the learners' thoughts, feelings and emotions are placed at the forefront of the human development. Humanists argue that human beings have a potential for learning and believe that significant learning will only take place when the subject matter is perceived to be of personal relevance to the learner, and when it involves active participation by the learner (Rogers, 1969). The humanist approach underscores the uniqueness of the individual and the pursuit for self-actualization. Self-actualized adults are self-directed, confident, mature, realistic about their goals, and flexible. In order to be self-actualizing, learners should be helped and encouraged to make choices for themselves in what and how they learn.

A number of language teaching methodologies like the silent way, suggestopaedia and community language learning are results of the humanistic approach to learning (Nunan, 1992; Tudor, 1996). This whole-person involvement in learning is concerned with the individual's search for personal meaning and focuses on the affective sphere of learning.

2.2.4 Current practice

The cognitive and the humanistic approaches to learning have had significant impact on language learning and teaching. However, these approaches were not able to shed light on the social aspects of language learning. Currently, language learning theories have been greatly influenced by SCT. The emphasis on the three tenets of the sociocultural perspective (social learning, mediation and genetic analysis) is on the process rather than the end product. As Goulet (1971) puts it, "How development is gained" is viewed as "no less important than what benefits are obtained at the end of the development road" since only participatory and democratic involvement of people in their own developmental process can assure that any change is sustainable (p. x).

The current emphasis on the role of social interaction is due to the fast-paced changes brought about by globalization and technological advancement. According to Warschauer (1997a) the sociocultural approach to language learning, illuminates the role of social interaction in creating an environment to learn language, learn about language, and learn through language. Therefore, the sociocultural perspective of learning forms the theoretical framework for this study on OC among ESL students.

2.3 Sociocultural approach to learning

The sociocultural approach to learning was derived in part from the concepts of Piaget's socio-cognitive conflict (1928) and Vygotsky's (1978, 1986) zone of proximal

development. Central to the sociocultural theory (SCT) of learning are the concepts of social learning, mediation and genetic or developmental analysis (Wertsch, 1991).

2.3.1 Social learning

Socio-cognitive conflict occurs when cognitive conflict arises due to a perceived contradiction between the learner's existing understanding and what the learner experiences resulting from social exchanges (Piaget, 1928). Further interaction takes place when the learner tries to resolve this conflict (King, 1997). From a conflict perspective, social interaction is regarded as essential to learning.

Likewise, Vygotsky views social interaction as a prerequisite for individual development. Vygotsky forwarded the idea of the dynamic interdependence between social and individual thinking processes i.e. the notion of social origin of mental functioning. Vygotsky (1981) stressed the primacy of interaction in human development as occurring twice, once between people (interpsychological) and the other within self (intrapsychological).

This does not mean that higher mental functions are merely direct copies of socially organised processes. Vygotsky (1978) conceptualised development as the transformation of socially shared activities into internalized processes. The process of internalization is transformative. According to Vygotsky (1978) aspects of the actual dialogue used during interaction are internalized by the individual as inner speech. Later the inner speech is used to guide the individual's thinking and problem solving during subsequent similar tasks and activities.

Vygotsky (1986) stresses that collaborative learning (CL) either among students or between students and a teacher, was essential for assisting students in advancing through their zone of proximal development (ZPD). He defines ZPD as "the distance between the actual developmental level as determined through independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p. 86).

Brown and her collaborators (1992, 1993) suggest that the active agents within the ZPD "can include people, adults and children, with various degrees of expertise, but it can also include artifacts, such as books, videos, wall displays, scientific equipment and a computer environment intended to support intentional learning" (1993, p. 191).

2.3.2 Mediation

Another important characteristic of the SCT is that of mediation i.e. the notion that all human activity is mediated by tools or signs (Wertsch, 1991). It is the key to all aspects of knowledge co-construction. Vygotsky (1981) listed a number of examples of semiotic means of mediation, "language; various systems of counting; mnemonic techniques; algebraic symbol systems; works of art; writing; schemes, diagrams, maps and mechanical drawings; all sorts of conventional signs and so on" (p. 137). By extension, John-Steiner and Mahn (1996) observe that "other tools, increasingly recognized in sociocultural discourse -- the paintbrush, computers calendars and symbol systems– are central to the appropriation of knowledge through representational activity by the developing individual" (p. 193).

According to Warschauer (1997b), these tools are important because of how they fundamentally transform human action. For Vygotsky (1981), by including these tools in the process of behaviour, they could alter the entire flow and structure of mental functions. Bruner (1986) in the introduction to Vygotsky's *Thought and Language,* describes Vygotsky's view of the role of mediation:

> He believed that in mastering nature we master ourselves. For it is the internalization of overt action that makes thought, and particularly the internalization of external dialogue that brings the powerful tool of language to bear on the stream of thought. Man, if you will, is shaped by the tools and instruments that he comes to use, and neither the mind nor the hand alone can amount to much. … And if neither hand nor intellect alone prevails, the tools and aids that are the developing streams of internalized language and conceptual thought that sometimes run parallel and sometimes merge, each affecting the other." (pp. vi-vii)

2.3.3 Genetic analysis

A focus of SCT is the use of genetic analysis to examine the origins and the history of phenomena, focusing on their interconnectedness. The focus of genetic or developmental analysis is that in order to understand the many features of mental functioning, it is important to understand their origins and transition they went through.

In describing this approach, Vygotsky (1978) emphasizes the importance of focusing not on the product of development but on the very process by which higher forms are established.

This perspective implies that learning and development take place in socially and culturally shaped contexts. Because conditions are constantly changing, resulting in changed contexts and opportunities for learning, John-Steiner and Souberman (1978) posit that there can be no universal schema that adequately represents the dynamic relationship between the external and the internal aspects of development.

Vygotsky (1978) sees higher mental functions as developmental processes in a constant state of dialectical change. He uses the dialectical approach to study the way concepts are learned and the processes through which they are acquired, appropriated, or internalized. Dialectical notion of synthesis is a changing and evolving nature of cognitive state. Vygotsky (1978) wrote, “The dialectical approach, while admitting the influence of nature on man, asserts that man, in turn affects nature and creates through his changes in nature new natural conditions for his existence” (pp. 60-61). Researchers use the dialectical approach to analyse internalization and individual and social processes which are fundamental to human development.

2.3.4 Internalization of social processes

The concept of internalization refers to the transformation of communicative language into inner speech and further into verbal thinking (Vygotsky, 1986). This means that internalization can be described as the formation of conceptual

understanding of new knowledge as a result of mutual negotiation and collaboration between learner and teacher. He sees the internalization of social processes as the mechanism for learning.

There are two processes that take place (the social and individual) in the sociocultural perspective of internalization. In working with, through, and beyond what they have appropriated in social participation and then internalized, the individuals co-construct knowledge. Chang-Wells and Wells (1993) in their study of the role of instructional conversations in classroom learning, describe the interdependent and transformative view of internalization thus, “It is at points of negotiation of meaning in conversation that learning and development occur, as each learner’s individual psychological processes mediate (and at the same time are mediated by) the constitutive intermental processes of the group” (p. 86). In other words, the learning group plays a profound role in learning and development, particularly, by providing the opportunity to focus on meaning and on the refinement of understanding. This process is crucial to internalization as it facilitates the construction, mediation and transformation of knowledge.

Salomon and Perkins (1998) observe that learning involves learning from others, with others and learning to contribute to the learning as a collective. They further conclude that the individual and social aspects of learning interact over time to strengthen one another (How Individual and Social Learning Relate, ¶ 9). This implies that one’s contribution to the learning of the collective is likely to benefit the individual as well.

2.3.5 Sociocultural approach and language learning

The sociocultural approach to learning has greatly influenced language learning. Language learning which previously focussed on grammatical competence has widened to encompass other forms of communicative competence, with the goal being not just formal knowledge but also the power to use language for meaningful interaction and agency (Warschauer, 2002).

The sociocultural approach emphasizes the importance of context in language learning. According to Warschauer and Meskill (2000) learning a language is seen as a process of socialization into particular communities. This can be realized through dialogic communication and interaction and not through the decontextualized acquisition of vocabulary or skills. The idea of dialogic communication means that meaning is developed during social interaction. The following are studies that provided language learners opportunities for computer-mediated communication with speakers of the target language: Kern (1996) who allowed his university French students to engage in ongoing dialogue with students in France about immigrant experience in the two countries; and Kendall (1995) whose Spanish students surveyed people in Latin American countries about a range of social issues.

The notion of mediation whereby tools such as language and computers can fundamentally shape the ways of human interactions, also influences language learning (Crook, 1994). In recent years, researchers have begun to use the computer as a vehicle for interactive human communication to study how language learners interact via the computer. The focus of such studies is on meaningful interaction especially the

negotiation of meaning in authentic discourse communities (Chun & Plass, 2000; Davis & Thiede, 2000; Meskill & Ranglova, 2000; Pellettieri, 2000; Shultz, 1996; Zahner, Fauverge & Wong, 2000).

The sociocultural approach promotes collaboration in language learning (Cummins & Sayers, 1997), and emphasizes language use in authentic social contexts (Warschauer, 1997a). In line with the sociocultural perspective of learning, this study will examine the OCL among ESL learners.

2.4 A case for collaborative learning

Gerlach (1994) theorizes that CL is based on the idea that learning is a naturally social act in which the participants talk among themselves and that it is through this talk that learning occurs. This is in contrast to the focus of the traditional behaviouristic belief on individual learning which has regarded the role of others in the learning process as ancillary.

The idea that collaboration is a basic form of human activity, essential for cultural development, is stressed intensively by many writers throughout the history of psychology (Bruner, 1996; Tomasello, 1999; Vygotsky, 1978, 1986). The concept of cooperative and collaborative learning, the grouping and pairing of students for the purpose of achieving an academic goal, was initially espoused by Johnson and Johnson (1987) and Slavin (1990). The term CL refers to an instructional method in which students at various performance levels work together in small groups toward a common goal. The students are responsible for one another's learning as well as that of their

own. Thus, the success of one student helps other students to be successful. In academic fields the term collaboration stresses the idea of co-construction of knowledge and mutual engagement of participants. In this sense, collaboration can be considered a special form of interaction.

Researchers have seen collaboration as a key feature in the creation of joint understanding and knowledge construction. Rochelle and Teasley (1995) stress the role of shared understanding, and wrote that collaboration is "a coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem" (p. 70).

The idea of CL is based largely on the theories of Piaget and Vygotsky. Vygotsky's (1978) SCT of learning emphasizes that learning takes place in a social context and that higher cognitive processes originate from social interactions. Vygotsky theorizes that individual cognitive gain occurs twice, first, through the intermental plane and then through the intramental plane (Wertsch, 1991). Vygotsky's (1978) notion of the ZPD posits that individual's cognitive development can be positively influenced by the assistance of an adult or more capable peer, adults or artifacts. This view assumes that because of engagement in collaborative activities, individuals can master something they could not do on their own without collaboration. People gain knowledge and practise some new competencies as a result of internalization in CL. In other words, learning takes place in the ZPD during collaboration. Collaboration can be seen as a facilitator of individual cognitive development. To draw from Vygotsky's views, peer interaction, scaffolding, and modelling are important ways to facilitate individual cognitive growth and knowledge acquisition.

Vygotsky's ideas also emphasize the role of mutual engagement and co-construction of knowledge. According to this perspective, learning is more a matter of participation in a social process of knowledge construction than an individual endeavour. Knowledge emerges through the network of interactions and is distributed and mediated among those (humans and tools) interacting (Cole & Wertsch, 1998).

Another important element that is related to collaboration is intersubjectivity primarily because intersubjectivity is "the process whereby two participants in a task who begin with different understandings of it arrive at shared understanding in the course of communication" (Tudge, 1992, p. 1365). The implication is that there is mutual agreement of points between the participants.

Piaget's idea of how collaboration can bring about learning is based on socio-cognitive conflict. Children on different levels of cognitive development, or children on the same level of cognitive development with differing perspectives, can engage in social interaction that leads to a cognitive conflict. This "shock of our thought coming into contact with others" (Piaget, 1928, p. 204) may create a state of disequilibrium within participants, resulting in construction of new conceptual structures and understanding. An equilibrium is thus established which is at a higher level of cognitive development (Forman & Cazden, 1985; Gilly, 1990; Tudge & Rogoff, 1989). The co-construction of knowledge takes place through one's increasing ability to take account of other peoples' perspectives. In essence, underlying Vygotsky and Piaget's ideas is that collaboration facilitates the co-construction of knowledge and mutual understanding.

Knowledge building is a special form of collaborative activity oriented towards the development of conceptual artifacts, and towards the development of collective understanding. Many researchers see CL from the perspective of participating in a knowledge-building community (Scardamalia & Bereiter, 1994), knowledge communities (Bruffee, 1993), and communities of learners (Brown & Campione, 1994; Jonassen et al., 1995). In a community of learners, as proposed by Brown and Campione (1994), the core activity is participation in collaborative process of sharing and distributing expertise. Brown (1994) reiterates that learning and teaching is dependant on creating, sustaining, and expanding a community of research practice which is necessary for survival.

Based on the perspective advanced by socioculturalists, a CL setting encourages learners to converse with peers, present and defend ideas, exchange diverse beliefs, question other conceptual frameworks, and be actively engaged (Smith & MacGregor, 1992). According to Johnson and Johnson (1987) there is persuasive evidence that cooperative teams achieve higher levels of thought and retain information longer than students who work quietly as individuals. The shared learning gives students an opportunity to engage in discussion, take responsibility for their own learning, and thus become critical thinkers (Totten, Sills, Digby & Russ, 1991).

2.4.1 Collaborative and cooperative learning

Collaborative and cooperative learning are two frameworks influenced by John Dewey and his belief that education should be viewed, “as a social enterprise in which

all individuals have the opportunity to contribute and to which all feel a responsibility" (as cited in Matthews et al., 1995, p.7). Dewey advocates cooperation and mutual assistance as a way of promoting the "interchange of thought" and unity of sympathetic feeling" that hold society together (as cited in Webb & Palincsar 1996, p. 843). Cohen (1994) defines cooperative learning as:

> … students working together in a group small enough that everyone can participate on a collective task that has been clearly assigned. Moreover, students are expected to carry out their task without direct and immediate supervision of the teacher." (p. 3)

Cohen's definition of cooperative learning encompasses CL, cooperative learning and group work. In contrast, Webb and Palincsar (1996) refer to cooperative learning as "alternative ways of organizing classrooms that contrast with individualistic and competitive classroom organizations" (p. 848). On the other hand, their view of CL is that, "the thinking is distributed among the members of the group" (p. 848). They further elaborate that "although certain forms of cooperative learning can occur without collaboration, CL is generally assumed to subsume cooperation." This is in direct contrast to Cohen's definition.

Meanwhile Roschelle and Teasley (1995) view cooperative work to be accomplished by the division of labour among participants, where each person is responsible for a portion of the problem solving. On the other hand, Cuseo (1992)

distinguishes cooperative learning from other forms of small group learning. He defines it as:

> A learner-centred instructional process in which small intentionally selected groups of 3-5 students work interdependently on a well-defined learning task; individual students are held accountable for their own performance and the instructor serves as a facilitator/consultant in the group learning process. (p.4)

Meanwhile Rochelle and Teasley (1995) define CL as "a coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem" (p.70). It differs from cooperative learning in one key way; where the output of cooperative learning is the synthesis of work done by individuals, CL has at its centre the notion of joint learning. The participants work together on a task and are jointly responsible for the strategies employed in achieving a satisfactory outcome. This has a number of valuable educational by-products because the process is a shared one whereby each participant has to articulate, justify and possibly defend their approach to the task. This obliges each participant to surface and explain tacit attitudes, values and theories of action. CL also develops skills of negotiation, assertiveness and listening.

According to Bruffee (1993) the key difference between cooperative and CL is that while cooperative learning holds students formally accountable for learning collectively rather than competing with one another, CL is to shift the focus of classroom authority informally from the teacher to student groups. This emphasis on

self-governance has its source in one of the important goals of CL that is to help adolescents and adults acknowledge dissent and disagreement and cope with difference. CL is always cooperative, but takes students one step further to a point where they must confront the issue of power and authority implicit in any form of learning but usually ignored.

From the definitions above, it is obvious that agreement on a single definition of cooperative and collaborative learning is not forthcoming. However, there is a general consensus that the essence of collaboration is convergence - the construction of shared meanings for conversations, concepts, and experiences (Brown & Palincsar, 1989; Roschelle, 1992; Roth, 1992). To elaborate, Roschelle (1992) explains that convergence is achieved through cycles of displaying, confirming, and repairing shared meanings. The repeated interactions lead to the joint use of meanings, meanings that are progressively constrained. The process of achieving consensus can also be considered the attainment of intersubjectivity, which Traverthen (1980) defines as "both recognition and control of cooperative intentions and joint patterns of awareness" (p. 330).

The above discussion brings us to a rather pertinent observation: Is there indeed a need for an agreed interpretation of collaboration? Dillenbourg (1999) suggests that what is important is to analyze collaborative activities on both micro and macro levels, and be concerned with aspects such as situation, interactions, processes, and effects. In a different light, Matthews et al. (1995) prefer to highlight the commonalities between collaborative and cooperative learning which include developing higher-order thinking

skills when participating in small-group activities, enhancing student reflection when articulating one's ideas in a small-group setting and consensus-building.

For this study, Rochelle and Teasley's (1995) definition of CL is used.

2.4.2 Factors for successful collaboration

To make CL a success, there must be some kind of "glue" that holds the group together (Johnson et al., 1993). Group members must feel they need one another, must want to help each other learn, and must have a personal stake in the success of the group. They also must have the skills necessary to make the group work effectively and be able to regularly analyze the group's strengths and weaknesses to make adjustments as needed. Some of the essential components necessary for effective collaboration are positive interdependence, promotive interactions, individual accountability and personal responsibility, and teamwork and social skills.

Positive interdependence means that team members need each other to succeed. Johnson and Johnson (1989) posit that positive interdependence exists when learners realize that they must coordinate their efforts with the efforts of others to complete a task successfully.

Maughan and Webb (2001) highlight the importance for group members to develop a group identity and a sense of collective responsibility for one another's learning. Group members have to know that they "*sink or swim together*". This implies that each group members' efforts are required and indispensable for group success and that each group member has a unique contribution to make to the joint effort because of

his or her resources, role and task responsibilities. Doing so creates a commitment to the success of group members as well as one's own. The National Institute for Science Education (1997) posits the importance of product goal interdependence i.e. when students must reach a consensus answer. This can be further strengthened through reward interdependence i.e. by having some form of shared grades for the group.

Promotive interactions give individuals opportunities to help each other overcome problems. Group members can promote each other's success by sharing resources and helping, supporting, encouraging, and applauding each other's efforts to achieve. Through the cognitive activities and interpersonal dynamics, group members are able to test ideas and build a framework for their knowledge. Such interaction motivates every member to continue to work on the task at hand (Johnson & Johnson, 1998).

There are two levels of accountability that must be structured into CL. The group must be accountable for achieving its goals and each member must be accountable for contributing his or her share of the work. Individual accountability exists when the performance of each individual is assessed and the results are given back to the group and the individual in order to ascertain who needs more assistance, support, and encouragement in learning. The purpose is to make each member a stronger individual. Students learn together so that they subsequently can gain greater individual competency. Members will reduce their contributions to goal achievement when the group works on tasks where it is difficult to identify members' contributions, when there is an increased likelihood of redundant efforts, when there is a lack of group cohesiveness, and when there is lessened responsibility for the final outcome.

Students who participate in CL groups do not want to work with others who want a free ride. The purpose of CL groups is to create academically stronger students. To accomplish this, students must contribute their fair share. The instructor must structure the groups so that individuals do not have an opportunity to "hide".

The importance of individual accountability cannot be overstated because this issue lies at the heart of the "fairness" issue that concerns many students. To encourage individual accountability, the group as a whole also needs to have certain group skills to keep everyone on board.

CL requires students to engage simultaneously in task work (learning academic subject matter) and teamwork (functioning effectively as a group). The ease with which students talk in groups in the minutes prior to the start of class does not indicate how well they will work in a small group on an academic task where they must rely on one another. The assumption that students will actively listen, be respectful and thoughtful, communicate effectively, and be trustworthy is not always correct. This implies that social skills must be taught to students and to remind them that teamwork skills are essential for achieving the course goals (Archer-Kath et al., 1994; Putnam et al., 1989). Leadership, decision-making, trust-building, communication, and conflict-management skills empower students to manage both teamwork and task work successfully. Since cooperation and conflict are inherently related (Johnson & Johnson, 1995), the procedures and skills for managing conflicts constructively are especially important for the long-term success of learning groups.

2.4.3 Structuring groups for collaborative learning

Although it remains unclear as to what conditions facilitate effective CL, few would dispute that group processes and mediating processes have major influences on outcomes of group work. Johnson and Johnson (1993) warned that poorly structured cooperative group may be counter productive. Webb and Palincsar (1996) made a list of features that have shown to influence group processes. The following features will be used for the purpose of this study: group composition, group size, preparation for group work and structuring group interaction.

To maximise the opportunities for peer collaboration, many cooperative methods recommend that groups be formed heterogeneously especially to reflect the diversity of ability, gender, and ethnic background in the class. The argument for grouping students of different abilities together is to benefit the low ability students who can learn from their better able peers. This is based on Vygotsky's (1978) theory of the ZPD and Piaget's (1928) theory of socio-cognitive conflict. Results of research on the heterogeneous pairing indicate benefits for low ability students (Azmitia, 1988; Hooper & Hannafin, 1988; Tudge, 1989; Webb, 1980).

Repeated evidence shows that more capable students often benefit by working with less capable students, and that students generate understanding and problem-solving strategies that no group member had prior to collaboration (Bell et al., 1985; Tudge & Rogoff, 1989). However, Webb and Palincsar (1996) note that heterogeneous pairing may not work for two reasons. The first being that the high ability students may dominate the group work and that the explanations offered by the high ability students

may be out of the ZPD zone of the low ability students. Nevertheless, they further note that few group compositions are optimal for all students.

Studies by Hazelwood et al. (1992) and Lockheed and Harris (1984) found that gender also influences children's cross-sex behaviours and attitudes, with boys dominating interaction in mixed-sex groups. In a study of mixed-sex group composition, Webb (1984) found that specific gender composition of the group may influence the behaviour of the group members. In the male majority group, the girl was ignored; in the equal number of boys and girls group, both the boys and the girls showed similar interaction patterns and achievement; and in the girl majority group, the girls directed their request for help to the boy who tended not to answer their questions

Although there is no empirical evidence to show that a certain group size is more preferred over another, cooperative literature acknowledges that group size influences group processes. Webb and Palincsar (1996) note that in computer learning settings, group size influences students' access to the computer. However, the consensus is that larger groups tend to allow students to shirk responsibility - whether they are working on the computer or not. Therefore, the underlying guide is to keep the groups as small as possible to promote positive interdependence, yet as large as necessary to provide sufficient diversity of opinions as well as resources to complete the task. Most researchers (Cooper et al., 1990; Johnson et al., 1998; Slavin, 1995) favour groups of four or five students because larger groups do not provide an opportunity for all members to participate and enhance their skills.

To help students with group work, proponents of CL train students with cooperative behaviour and social skills (Gibbs, 1987; Kagan, 1992; Webb & Farivar,

1994). Solomon et al. (1990) observe that ideally, all classroom experiences are designed to develop "autonomy, self-direction, community participation, responsible decision making, being helpful to others, learning to understand and appreciate others, and learning to collaborate with others" (p. 236). Studies have shown that programmes of team building and prosocial development activities seem to improve students' ability to communicate with one another (Cohen et al., 1990; Fitch, 1990; Kuti et al., 1992). King (1997) in a study using the *ASK to THINK- TEL WHY* model assigned roles to seventh graders. One student was trained to ask questions and to sequence the questions in a particular way, and the other to make corresponding responses. The study found that the model promoted students' construction of new knowledge, better retention of that knowledge, and their ability to transfer their questioning skill to a new context unprompted.

One way to structure group interaction is through structuring the task to control the kinds of interaction that students engage in. These include assigning specific roles to students (Kagan, 1992; Yager et al., 1985); getting students to ask specific types of questions (King, 1992; Pressley et al., 1992; Wittrock, 1990) and explanations (Coleman, 1992; Palincsar et al., 1993); and requiring students to argue with each other to reach consensus (Smith et al., 1984; Johnson et al., 1985).

These are some suggestions to structuring groups to promote group processes. Nevertheless, it is still unclear as to what conditions facilitate effective CL.

2.4.4 Collaborative learning and cognitive growth

Previous studies on CL compared a collaborative instructional method to a non-collaborative method on outcome measures alone (Bossert, 1988). However, recent research on CL is now moving away from this approach.

In a study to examine the effectiveness of individual learning and CL in enhancing drill-and-practice skills and critical thinking skills, Gokhale (1995) found that students who participated in CL had performed significantly better on the critical-thinking test than students who studied individually. It was also found that both groups did equally well on the drill-and-practice test. Further, Gokhale notes that in his study, he provided students with opportunities to analyze, synthesize, and evaluate ideas cooperatively. The informal setting facilitated discussion and interaction that helped students to learn from each other's scholarship, skills, and experiences. The students had to go beyond mere statements of opinion by giving reasons for their judgments and reflecting upon the criteria employed in making these judgments. Thus, each opinion was subject to careful scrutiny. The ability to admit that one's initial opinion may have been incorrect or partially flawed was valued.

In another study, Bell et al. (1985) found that children working with peers showed more cognitive growth than children who worked alone. They measured the children's performance on conservation tasks. They also observed that the cognitive growth was only possible when the child is actively engaged in the problem solving. Similarly, Webb and Palincsar (1996) note that, "active participation in dialogue is essential for the transition of self-regulation from the social plane to the intrapersonal

plane" (p. 846). An empirical test of this was done by Brown and Palincsar (1989). Their study was conducted with middle-grade students. They compared teacher modelling of four text comprehension strategies (questioning, summarising, predicting and clarifying) with reciprocal teaching among students in which students used these same strategies. They found that the performance of students in the reciprocal teaching condition was significantly better than those who watched the teacher engage in think-alouds.

Forman and Cazden (1985) observe students' discourse in solving collaborative problems. Their results support Vygotsky's two phases of social process. In the initial phase of problem solving, students encourage, support, and guide each other are often observed. In the second phase, students come to their own conclusions based on experimental evidence, and resolve their conflict by articulating their argumentation. They concluded that students could gain new strategies through peer collaboration by interpersonal discourse.

In essence, collaborative learning has gained increasing acceptance in classroom here and abroad as a strategy for producing learning gains, the development of higher order thinking, prosocial behaviour, interracial acceptance, and as a way to manage academic heterogeneity in classrooms with a wide range of achievement in basic skills. Theoretically, small groups offer special opportunities for active learning and substantive conversation (Nystrand, 1986) that are essential for authentic achievement, a goal recommended in the current drive to restructure schools. Small groups have also been widely recommended as a means to achieve equity (Oakes & Lipton, 1990).

Cohen (1994) notes that the variability in findings suggests that the advantages obtained from learning in groups can actually be obtained only under certain conditions. Numerous studies now manipulate features of CL to highlight the importance of particular conditions for success on different kinds of instructional outcomes. In addition, observational studies that examine processes of interaction in relationship to outcome variables are useful in highlighting which features of interaction are more important in assuring particular outcomes. Analysis of the conditions under which optimal features of interaction are likely to occur, permits an inference concerning conditions for productivity.

2.5 Online collaboration

Computing technology has created new challenges for learning and brought about new learning possibilities for almost all teaching and learning situations, including traditional classroom teaching, distance learning and self-learning (Salomon, 1991). Online collaborative learning or online collaboration refers to collaborative learning that is supported by computers whether synchronously or asynchronously (Teng, 2007; Tsai, 2010). The theme of OC is common to the overlapping literature of computer-supported collaborative learning (De Wever et al., 2006; Kreijns, Kirschner & Jochems, 2003; Schrire, 2006; Stahl, Koschmann & Suthers, 2006; Strijbos et al., 2004). Of interest to education research is the online learning environment that allows for meaningful CL when students exchange messages through computers with one another (Pena-Shaff & Nicholls, 2004).

The theoretical base of OC, online collaborative language learning, social interaction, interaction and tasks, interaction analysis, and research on interaction analysis are addressed in this section.

2.5.1 Theoretical base of online collaboration

Lipponen (2002) describes OC as focusing on how technology supports CL and can improve peer interaction which facilitates the sharing and distributing of knowledge. Meanwhile, Ritchie and Hoffman (1996) perceive OCL as utilizing the attributes and resources of the Web to create a meaningful learning environment where learning is fostered and supported. To put it simply, OC is primarily concerned with studying how people can learn together with the help of computers.

CL is conceived as a shared social activity, which leads to the collaborative construction of knowledge (Scardamalia & Bereiter, 2003; Stahl, 2005; Stahl et al., 2006). Roschelle and Teasley (1995) define CL as "a coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem" (p. 70). Dillenbourg and Schneider (1995) define CL as situations whereby two or more people synchronously and interactively build a joint solution to some problems. OC promotes the collaborative process in which meaning is negotiated and knowledge is co-constructed (Lazonder et al., 2003). Central to CL is the emphasis on the co-construction of knowledge and mutual engagements of participants in the development of collective understanding. Collaborative knowledge building conceptualizes learning as a social practice. This is because CL is seen from the

perspective of participating in a “knowledge-building community” (Scardamalia & Bereiter, 1994), a “community of practice” (Lave & Wenger, 1991), “community of learners” (Brown & Campione, 1994) or “communities of learners” (Jonassen, et al., 1995).

Underpinning the notion of OCL are the concepts of Vygotsky’s (1978) ZPD and Piaget’s socio-cognitive conflict (1928). Vygotsky conceive social interaction as essential to knowledge construction. Vygotsky argues that CL was necessary to help students advance through their ZPD. He defines ZPD as the distance between the actual developmental level as determined through independent problem solving and the level of potential development as determined through problem solving in collaboration with more capable peers. So, knowledge construction is seen to be evolving from a social (interpsychological) level to an individual (intrapsychological) level.

Piaget’s socio-cognitive conflict is seen as a mechanism to promote learning. Cognitive conflict arises because of the perceived contradiction between what the learner knows and what the learner experiences as a result of social interactions. A state of disequilibrium is created between the learners, which then require further interaction to resolve the conflict resulting in the co-construction of knowledge. The co-construction of knowledge takes place through the learner’s increasing ability to take into account other peoples’ perspectives.

Therefore, OC is very much influenced by the theories advanced by Piaget and Vygotsky who perceive learning as a social process rather than an individual endeavour. Learning is a social activity and there exists a close relationship between the interpersonal (interpsychological) and the intrapersonal (intrapsychological) activities.

In other words, OC supports individual and group learning through mutual engagements and co-construction of knowledge. Therefore, knowledge is seen to emerge through the network of interactions and is distributed and mediated among those interacting (Cole & Wertsch, 1996).

2.5.2 Online collaboration and language learning

Current educational researchers are increasingly looking towards computers as a new medium to provide a context for CL (Garrison & Anderson, 2003; Koschmann, 1996; McConnell, 2000; Newman, Griffin & Cole, 1989). This is because CL supported by the computer offers promising innovations and tools for students to interact with responsive, dynamic environments that support learning (Wu, Farrell & Singley, 2002). Warschauer and Healey (1998) note that the rise of computer-mediated communication has reshaped the uses of computers for language learning.

Johnson (1991) observes that "theory in second language acquisition and research in second language acquisition classrooms indicate that the social interactional environments of the classroom are crucial factors that affect language learning in important ways" (p. 62). He further suggested that CALL research take into account the social interactional environment as he noted that previous research on computers and learning in educational environments has primarily focussed on the cognitive aspects of learning. Chapelle (2000) concurred when she noted that relatively little work has been done to investigate the sociocultural context of CALL and called for the inclusion of cross-cultural perspectives in research on CALL, including "a cultural constructivist

approach" (p. 218). According to Crook (1994), this approach "makes sense of 'learning' by reference to the social structure of activity-rather than by reference to the mental structure of the individuals" (p. 78). The social constructivist approach is similar to the sociocultural approach to learning in that they share their roots in the works of Vygotsky (1978) and Piaget (1928) which emphasize that learning is not an individual endeavour.

Based on the sociocultural approach to learning, knowledge emerges through the network of interactions and is distributed and mediated among those (humans and tools) interacting (Cole & Wertsch, 1998). Researchers like Lipponen (2002) and Stahl (2002) believe that collaboration and technology help knowledge building by facilitating the sharing and distributing of knowledge and expertise among community members. The main attraction of the notion of collaborative knowledge building is the hope that computer support can significantly increase the ability of the groups of students to build concepts, ideas, theories and understandings together.

Vygotsky (1978, 1986) illuminates the role of social interaction in creating an environment to learn language, learn about language, and learn through language. All higher-order functions were, thus, seen as developing out of social interaction.

Studies have shown that OC supports language learning by fostering joint understanding and knowledge building. Shared discourse spaces and distributed interaction can offer multiple perspectives and ZPDs for students with varying knowledge and competencies. Online collaborative learning environments offer greater opportunities to share and solicit knowledge. For instance, Pellettieri (2000) carried out a study to investigate the potential of task-based network-based communication to

foster the negotiation of meaning and interaction between pairs of intermediate students of Spanish during synchronous discussion. She found that there were a large number of embedded routines (negotiations within negotiations) in the students' interaction which indicate that the students went to extensive effort to ensure mutual understanding. Moreover, the results showed that students used more target forms through meaning negotiations, corrective feedback, and self-repair. This resulted in correct use of complex grammatical constructions.

Besides creating joint understanding and knowledge building OC also promotes reflection. Online conferencing offers both synchronous and asynchronous communication which allows students time for reflection during interaction with one another (De Wever, Schellens, & Valcke, 2004). Students also have the opportunities to think, and search for extra information before contributing to the online discussion.

Pellettieri (2000) observed that reflection assists in language learning. In her study investigating the negotiation of meaning and interaction among students of Spanish, she found that the written communication captured online allowed the students more time to reflect and process language than face-to-face interaction. She found that because students were able to view their language as they produce it, they were more able to monitor and edit their messages resulting in more quality interlanguage than non-electronic environment. According to Lipponen (2002) and Pena-Shaff and Nicholls (2004), making thinking visible by writing help students to reflect on their own and others' ideas and share their expertise.

Another study that showed the reflective aspects of written communication was seen in a study by St. John and Cash (1995). They observed that a high-intermediate

learner of German was able to learn the German language during a six month email exchange with a native German speaker. The learner read and stored the email and made an effort to use the new vocabulary and phrases which assisted in his language learning. The online database was utilized as a collective memory, storing the history of knowledge construction processes for revisions and future use. At the end of the six months, the learner was able to use more complex structures, longer sentences, more correct word order and "more natural German" (p.193).

Kroonenberg (1994/1995) involved her high school French students to work in pairs to debate positions online. She found that the online written communication allowed the students to reflect and pay closer attention in the midst of interaction. To be able to participate meaningfully in conversations, the students needed to be able to interpret messages, consider appropriate responses, and construct coherent replies. Online communication provides the support for students' attempts to converse and to support their discourse skills. Tiessen and Ward (1997) note that the written communication/threaded discussion captured online permits students to revisit, revise and build upon their own ideas and those of their peers, without the teacher mediating these interactions. Kroonenberg found that the students were more expressive in this mode than in written composition whereby she observed that every sentence weighs heavily on the students' minds. Likewise, they were less expressive in oral conversation which deters shy students. This shows that in a traditional classroom, many students are not able to engage in cogent and coherent discourse. As a result, Kroonenberg found the students more expressive and the quality of their oral discussions enhanced and thinking more creative.

Therefore, the above studies show that OC is seen to facilitate and enhance language learning.

2.5.3 Online collaboration and social interaction

According to Lantolf (2000) the central and distinguishing concept of SCT is that higher forms of mental activity are mediated by others in social interaction; by self through private speech; and by artifacts like tasks and technology. Hence, the driving force underlying the notion of OC is that learning is a social process whereby learners acquire competence through interactions (Bonk & Wisher, 2000; Stahl, Koschmann & Suthers, 2006). Suthers et al. (2007) conceive learning as "an interactional process of change" (p. 696). Many researchers view social interaction as the key to OCL (Dykes, 2001; Gunawardena et al., 1997; Kapur & Kinzer, 2007; Kreijns, Kirschner & Jochems, 2003; Schrire, 2006; Suthers et al., 2007). Hence of concern to OC is group interaction.

Garrison and Anderson (2003) view interaction as the component that is crucial for meaningful learning. According to Dewey (1916) interaction is the fundamental component of the educational process that occurs when the learners transform the inert information passed to them from another and constructs it into knowledge with personal application and value. Wagner (1994) defines interaction as reciprocal events that require at least two objects and two actions, which mutually influence one another. Bretz (1983) meanwhile view interactivity as a three-step process whereby firstly there is communication of information, followed by the first response to this information and finally, the second answer relating to the first.

In the context of OC, Henri (1992) used Bretz's definition but subdivided interaction into interactive and non-interactive statements whereby the interactive statements were further divided into five categories which included both explicit and implicit statements. Schrire (2006) also describes interaction as relating to the messages that are responses to others both explicitly and implicitly, and is differentiated from participation which refers to "the number or average length of messages posted" (p. 53). Fahy et al. (2001) define interaction as "the totality of interconnected and mutually-responsive messages" (Gunawardena, et al., 1997, p. 407). Gunawardena et al. (1997) place emphasis on the 'entire gestalt of accumulated interaction" (p. 411) at shared meaning making. In other words, the communicative whole is greater than the sum of the individual posting of messages. Stahl et al. (2006) concur with the definition of both Gunawardena et al. (1997) and Fahy et al. (2001), when they attribute the shared meaning making to interactional achievement. They note that interaction takes place across the sequences of utterances or messages from multiple participants and not attributable to individual utterances alone.

Anderson (2002) notes that it is difficult to find a clear and precise definition of the term interaction in the education literature. Despite the various definitions of interaction, they have in common that interaction is essentially concerned with shared meaning making.

2.5.4 Online collaboration and tasks

The idea of the importance of interaction in language learning was first suggested by Hatch (1978). She called for researchers to look toward interaction for insight into second language development specifically how the learning of second language structure evolved out of communicative use. Krashen (1981) and Long (1980) add that social interaction facilitates language learning especially when learners negotiate toward comprehending each other's meanings. Pica, Kanagy and Falodun (1993) also note that language is best learned through interaction whereby learners can exchange information and communicate ideas during activities. They further suggest that these activities are structured to facilitate the sharing of ideas and opinions, collaborating toward a single goal. Pica et al. (1993) suggest that "to engage in the kinds of interaction believed to activate acquisition processes, classroom and research must be structured to provide a context whereby learners not only talk to their interlocutors, but negotiate meaning with them as well" (p.11). Arising from this, initiatives in developing activities can be seen in the use of tasks in research especially on negotiation. The emphasis of negotiation is on achieving comprehensibility of message meaning.

Therefore, tasks are seen as important for collaborative language learning. The sociocultural perspective of learning emphasize that higher forms of mental activity are mediated by others in social interaction; by self through private speech; and by artifacts like tasks and technology (Lantolf, 2000). Hence, besides the online environment, tasks

also play an important role in collaborative language learning because they have an effect on the interaction that takes place.

Bygate, Skehan, and Swain (2001) define a task as "an activity which requires learners to use language, with emphasis on meaning, to attain an objective." According to Lee (2000), a task is a classroom activity that has an objective obtainable only by the interaction among participants; a mechanism for structuring and sequencing interaction; and a focus on meaning exchange. The purpose of the task is its outcome and what the participants need to do to reach an outcome. Pica et al. (1993) note that tasks are goal-oriented activities i.e. activities which participants must carry out so as to arrive at an outcome. Seen from this perspective, tasks can be seen as tools for constructing collaborative acts. This is because the participants have to structure and sequence their interactions in order to achieve the outcome of a task. Therefore, it is the interaction and the process of negotiating for meaning that are important in the context for language learning.

Seen from the sociocultural perspective of learning, tasks "must be structured in such a way that they pose an appropriate challenge by requiring learners to perform functions and use language that enable them to dynamically construct ZPD" (Ellis, 2004, p. 179). In other words, tasks can be seen as a tool for learners to identify and provide assistance to each other so that appropriate ZPDs can be created. This can be accomplished through scaffolding which is the dialogic process in which speakers assist one another in performing beyond their existing developmental level. Instead of scaffolding, Swain (2000) used the term collaborative dialogue which he defines as "dialogue in which speakers are engaged in problem solving and knowledge building"

(p. 102). In other words, the construction of knowledge occurs when learners use the second language (L2) to jointly address a problem, and respond to the language forms that arise in the utterances that they produce (Ellis, 2004). Therefore, tasks which result in scaffolding and collaborative dialogue provide opportunities for learners to extend their knowledge of L2.

Appel and Lantolf (1994) point out that what is important is how performance depends crucially on the interaction of the individual and task and not so much the task itself. This means that tasks have an effect on the interaction that takes place between the learners. Because tasks are goal-oriented activities, learners must therefore take steps to seek help (whenever they do not understand something) and to make themselves understood whenever their message is not clear. Therefore, this provides learners with the opportunity to activate and apply comprehension and production processes (Pica et al., 1993).

Task factors affect interaction and the negotiation of meaning (Ellis, 2004; Pica et al., 1993). The task variables considered by Pica et al. (1993) are the type of interactional activities and communication goals. Interactional activities are divided into interactant relationship and interaction requirements. The former refers to the responsibilities of task participants i.e. whether they request or supply information needed to achieve task goals. On the other hand, interaction requirements refer to required or optional information exchange. Communication goals are divided into goal orientation and outcome options. There are two types of goal orientation which are collaboration or convergence, and independence or divergence. The two outcome options are one outcome possible or multiple outcomes possible.

Studies have found that required information exchange generated more amount of negotiation than optional information exchange (Nakahama, Tyler & van Lier, 2001; Newton, 1991; Pica & Doughty, 1985; Smith, 2003). Nakahama et al. (2001) found that although required information exchange generated a greater amount of negotiation, the exchanges were mechanical centring on lexical items. However, the no information exchange produced greater negotiation of global problems, like anaphoric reference, paraphrase and wider use of discourse strategies to name a few. Newton (1991) on the other hand, found that required information exchange tasks resulted in almost double the amount of negotiation. In a study carried out in 1993, Newton found that there was slightly more gain in vocabulary in the required information exchange tasks. When comparing the amount of negotiation that occurred between required information exchange and optional information exchange tasks, Foster (1998) found more negotiation in pairs than in groups irrespective of tasks. She concluded that the best context for negotiation was dyads performing information exchange task because it consistently elicited negotiation compared to optional information exchange task.

Dillenbourg et al. (1996) believe collaboration with different computer-based tasks and activities may yield very different interactions and learning outcomes. Smith (2003) carried out a study on task–based, synchronous computer–mediated communication (CMC) among intermediate–level learners of English and he found that learners negotiate for meaning in the CMC environment when nonunderstanding occurs. In addition, he found that task type does affect the extent to which learners engage in negotiation. Blake (2000) studied fifty intermediate L2 Spanish learners who

worked in pairs using a synchronous chat program. They found that tasks that required information exchange promoted negotiation.

Another task factor that affects negotiation is the task outcome. There are two types of task outcomes i.e. open tasks and closed tasks. Open tasks refer to tasks where there are no predetermined solutions whereas closed tasks are those that require learners to reach a single correct solution. Studies have shown that closed tasks produced more negotiation than open tasks (Berwick, 1990; Newton, 1991; Pelliettieri, 2000). Pelliettieri carried out a study examining the interactional modifications that took place during synchronous electronic discussion under a variety of task conditions between pairs of intermediate students of Spanish. She found that closed tasks resulted in more negotiation than open tasks. In addition, she found that difficult tasks generated more negotiation than easy tasks. Studies have shown that the difficulty level of the tasks affects the amount of negotiation produced (Anderson & Lynch, 1988; Nunan, 1989; Pica et al., 1993).

Furthermore, whether tasks are carried out in the classroom or in an online environment has an effect on the interaction and the negotiation that takes place. Smith's (2003) study on task–based, synchronous CMC showed that although the negotiation resulting from the online environment are quite similar to face–to–face negotiation, there are nevertheless observed differences. Payne and Whitney (2002) note that studies of L2 online conferencing have an effect on the dynamics of conversational interaction. Warschauer (1996) and Kern (1995) found that students tend to produce more complex language in chatrooms than in face-to-face

conversational settings. Furthermore, it was found that there is more participation especially among the quieter students (Warschauer, 1996; Kern, 1995; Chun, 1994).

Therefore, task variables have an effect not only on the amount of negotiation that takes place but also the quality of the negotiation. What all these suggest is that there is no specific recommendation for the best context to study interaction and negotiations. Ellis (2004) points out certain tasks may generate a greater quantity of negotiation but other tasks may afford opportunities for different kinds of language use and negotiation. What this means is that researchers will have to choose the best context (environment or task types) that best suits the design and the purpose of the study.

2.5.5 Tasks and reading performance

There are many definitions of a task (Bygate et al. 2001; Crookes, 1986; Lee, 2000; Prabhu, 1987; Richards et al., 1985; Skehan, 1996). However, one of the essential features of these definitions of tasks is that they result in a clear outcome. According to Ellis (2003) 'outcome' refers to what the learners arrive at when they have completed the task (p. 8). Skehan (1996) notes that task outcomes are important because they are the basis for the evaluation of task performance. Ellis (2003) further points out that there is a need to examine the actual outcomes which include both the process and product of the task to see if they match the expected outcomes. The evaluation of the process would then depend on the expected outcome. If the outcome was to negotiate for meaning then the task should result in the use of clarification,

requests and confirmation. On the other hand, the evaluation of the product refers to some form of tests that can measure the learning outcomes to demonstrate any significant change in the students' performance.

Likewise, reading outcomes include both the evaluation of the process and product of learners' comprehension of reading texts. Previous researches on the process of reading have concentrated on examining the models of reading and learners' strategy use in reading. Models of reading include the bottom-up model (Barnett, 1989; Carrell, 1989a; Rott & Williams, 2003), the top-down model (Alexander & Fox, 2004; Carrell & Eisterhold, 1983; Goodman, 1967; Smith, 1978) and the interactive model (Ajideh, 2003; Barnett, 1989; Rumelhart, 1977). According to the interactive model, learners use both top-down and bottom-up information to construct meaning from the text.

One important factor that influences learners' active construction of meaning from the text is the use of reading strategies. Understandably, this led to many studies on the process of learners' reading comprehension which focussed on reading strategies employed by learners (Block, 1992; Brantmeier, 2002; Chamot & Kupper,1989; Oxford, 1990; Singhal, 2001). Therefore, it is not surprising that the evaluation of learners' reading performance that is the product of reading is through their comprehension scores.

According to Carrell (1989b), apart from reading strategies, other factors that affect learners' comprehension of reading texts include the readers' purpose (Anderson, (1991), language proficiency (Davis & Bistodeau, 1993) and background knowledge (Afflerbach, 1990; Pritchard, 1990). The implication is that reading outcomes are

dependent on the reading tasks set by language instructors. Hence, numerous studies have been carried out to investigate how reading tasks influence the reading outcomes specifically that of strategy use in reading comprehension.

So far, studies investigating reading tasks that affect strategy use included tasks that used different text types. In addition, these studies also included the variable of learner's prior knowledge when reading these texts. Afflerbach (1990) and Pritchard (1990) examined the effects of familiar and unfamiliar texts on strategy use. Afflerbach's 1990 study required anthropology and chemistry students to identify and state the main idea of a text which was not explicitly stated. Reading tasks using texts from familiar and unfamiliar domain were used for this study. The study concluded that expert readers were able to construct the main idea more often when reading familiar topics than unfamiliar ones. Similarly, Pritchard's (1990) study used culturally familiar and culturally unfamiliar texts. He found that students used more strategies with culturally familiar text than the unfamiliar one. These show that prior knowledge plays an important role in influencing learner's reading performance.

Besides tasks that used familiar and unfamiliar texts, Jiminez et al. (1996) and Kucan and Beck (1996) studied tasks that used expository and narrative texts to examine if different types of text affect students' strategy use. Both studies confirmed that different types of texts influenced students' strategies use. Young (1993), on the other hand, used authentic and edited texts in his study. The results showed that students comprehended more from the authentic texts than the edited ones. Other studies included tasks that used passages of differing difficulty levels. For example, Kletzien (1991) found that good and weak students used the same type and number of

strategies when reading the easy passage. However, the good students used more strategies when reading the difficult passage as compared to the weaker students. Kim (2009) looked at the effects of task complexity on learner-learner interaction. The study showed that task types and learner proficiency have a bearing on the effects of task complexity on the occurrence of learning opportunities. All these mean that different reading tasks involving the use of different text types whether in terms of level of difficulty, prose types, familiar or unfamiliar, and authentic or edited texts, have a bearing on the students' reading performance.

Another factor that influences the students' reading performance is the purpose of a reading task. Anderson (1991) examined the differences in strategy use on two types of reading tasks which were standardized reading comprehension tests and textbook reading comprehension. Block (1992) carried out a study that investigated L1 and L2 readers monitoring process when they carried out two tasks. The first task involved the search for a referent and the other a vocabulary problem. Other studies on reading tasks include problem word solving. Chern (1993) and Huckin and Bloch (1993) examined word-solving strategies. Both studies found that students used a variety of strategies for successful comprehension.

As can be seen above, most research on reading performance investigated students' use of reading strategies because it influences students' active construction of meaning from the text. In addition, all the studies mentioned above looked at the individual processes (strategy use) and not group processes in the construction of meaning from text. There seems to be a lack of studies that investigated how tasks influence students' reading performance in terms of group processes involved in the

construction of knowledge. Based on the sociocultural perspective of learning, the evaluation of the reading task performance would then require examining the patterns of interaction (the group processes) during knowledge construction and the ZPD in learners.

2.5.6 Online collaboration and interaction analysis

Given that tasks have an effect on the interaction that takes place during CL, it is therefore important to examine what these effects are. This is because the sociocultural perpective of learning espouses that social interactions that are carefully scaffolded are acknowledged to be important in OCL. By scaffolding the interactions to bridge the learner's ZPD, learners can develop higher levels of intellectual and social discourse (Yates, 2001). Therefore, the careful scaffolding of the interactions during OC can facilitate knowledge construction (Kanuka & Anderson, 1998; Murphy & Gazi, 2000; O'Reilly & Newton, 2002; Wilson & Stacey, 2004).

Kern and Warschauer (2000) observe that the written nature of the online discussion allows greater opportunity for the students to attend to and reflect on the form and content of the communication. With OC, students have the freedom to respond to and build upon each other's responses. As learners develop new ideas and contribute them to the discourse, agreement emerges in the development of shared knowledge. Shared knowledge is created through a process of convergent understanding and gradual refinement (Roschelle, 1992). Since knowledge is shared and owned by the discourse community, it is not only apprehended better by the

members but also more likely to be appropriated by the members. Such knowledge is more meaningful and lasting to the members of the community than that which is dispensed by the teacher because there is ownership of the ideas. According to Jonassen and Remidez (2002), shared understanding through consensus building supports the mutual interdependence of members of the discourse community, which is an essential characteristic of CL that is too often ignored.

Hence, the current push in the field of OC is towards examining the complexities of interactional dynamics during group processes (De Wever et al., 2006; Kapur, Voiklis & Kinzer, 2007; Kreijns et al., 2003; Lazonder et al., 2003; Schellens et al., 2007). In the context of OC, the data are confined in the online transcripts. One of the strengths of online environments is that students exchange messages through computers with one another. According to Macdonald (2003) the fact that these exchanges are made explicit through written messages ‘‘makes the process of collaboration more transparent [for the researcher], because a transcript of these conference messages can be used to judge both the group collaborative process and the contribution of the individual to that process…’’ (p. 378).

According to Garrison et al. (2006) one of the methodologies with considerable potential to explore the complexities of online learning is transcript analysis which offers a new observational technique to understanding online discourse. Wertsch (1994) notes that online discussions support the investigation of group processes during collaboration because it makes visible how knowledge emerges through interactions. Because learning takes place chiefly through interactions among students, the shared process requires students to actively articulate, justify and defend their approach to a

shared task. Students are therefore obliged to make explicit their ideas in this process. Furthermore, the discussion threads facilitate the study of the evolution and development of learning. Lotman (1988 as cited in Warschauer, 1997a) postulates that the threaded discussions are not just seen as links for conveying information, but rather as thinking devices used to collaboratively generate new meanings. This observation is further strengthened by Bakhtin (1986) who views all utterances (spoken or written) to be filled with dialogic overtones, based on echoes and reverberations of other utterances to which it is related by the communality of communication. In this view, the unique speech experience of each individual is shaped through constant interaction, and more focused interaction leads to higher forms of learning. Therefore, the data from the online transcripts that capture the interaction among the participants allows for the study of the quality of learning (Meyer, 2004), collaborative learning processes **(**Wertsch, 1994**),** the process of knowledge construction (Gunawardena, Carabajal, & Lowe, 2001) or critical thinking (Bullen, 1997; Newman, Webb, & Cochrane, 1995). Stahl (2006) also notes that the analysis of the transcripts can help to understand the effects of CL on the measures of individual learning.

According to Dillenbourg et al. (1996) research on CL has shifted focus from how individuals function in a group to the group processes to study the properties of interaction. Stahl et al. (2006) note that because learning occurs socially as the collaborative construction of knowledge, it is important to focus on what was taking place between and among learners in their interactions. They suggest that new methodologies are needed to analyze and interpret group interactions for collaborative negotiation and social sharing of group meanings. Traditional psychological methods

which concentrated on the individual functions were considered unsuitable. This was because cognition is seen as a product of individual information processors and social interaction is seen as a support for individual activity. Hence, new methods were required to analyze the group processes for knowledge construction and shared meaning making.

2.5.7 Related studies on interaction analysis

There is a large body of recent educational research examining online discussions (Fahy et al., 2001; Gunawardena et al., 1997; Henri, 1992; Kapur & Kinzer, 2007; Pawan et al., 2003; Pena-Shaff & Nicholls, 2004; Schellens & Valcke, 2005; Schrire, 2006; Suthers et al., 2007; Zhu, 1996). Regardless of the differences in the definition of interaction, these studies consider content analysis or interaction analysis of computer transcripts as essential to assessing the quality and process of the learning experience in the online environment especially in examining how meaning is negotiated and knowledge is co-constructed (Lazonder et al., 2003). De Wever et al. (2005) stress that content analysis is aimed at revealing the latent content i.e. information found below the surface, of the online transcripts. According to Schwandt (2001) content analysis is a generic name for a variety of textual analyses that typically involves comparing, contrasting, and categorizing a set of data. He further adds that content analysis can involve both numeric and interpretive data analyses.

Over the past two decades, numerous methods have been developed for interaction analyses as a result of the growth of research on OCL. Henri (1992) has

been acknowledged as among the first to develop an instrument for content analysis. Central to Henri's content analysis instrument was interactivity. The analytical framework for the analysis of the learning process addressed five dimensions i.e. participative, interactive, social, cognitive and metacognitive process. The participative dimension consists of two categories i.e. the overall frequencies of messages and accesses to the discussion, and the active participation in the learning process which relates to the number of statements directly related to learning made by learners. The social dimension includes statements which are not directly related to formal content of the subject matter. The interactive dimension is divided into five categories which are mainly derived from the interactive and non-interactive statements. The cognitive dimension comprises five categories which are elementary clarification, in-depth clarification, inference, judgment, and the development of strategies. These categories were for the analysis of critical thought. The metacognitive dimension includes the metacognitive knowledge and metacognitive skills.

Henri examined actual content of computer messages by breaking up the messages into "meaning units" and analyzing them for cognitive and metacognitive content. "Meaning units" is similar in form to the conventional thematic unit described by Budd, Thorp and Donahue (1967) as " a single thought unit or idea unit that conveys a single item of information extracted from a segment of the content" (p. 43 as cited in Rourke et al., 2001). "Meaning units" was used as the unit of analysis because Henri suggested that one message may contain more than one idea. Henri's approach to content analysis is recognized for its focus on social activity and the interactivity of the

individuals within the group. Furthermore, it examines the cognitive and the metacognitive processes of the individuals (Lally, 2001).

Nevertheless, Lally pointed out that Henri's framework "gives us no impression of the social co-construction of knowledge by the group or the individuals as a group" (p.401). The framework was not empirically tested and was criticized (Bullen, 1997; Gunawardena et al., 1997; Newman et al., 1995; Pena-Shaff, Martin, & Gay, 2001; Pena-Shaff & Nicholls, 2004). Nevertheless, Henri was considered a pioneer in developing the coding scheme for analyzing the content of online discussions. Subsequent research used Henri's work as the basis for further development (Gunawardena et al., 1997; Hara, Bonk, & Angeli, 2000; Newman et al., 1995; Pena-Shaff et al., 2001).

Hara, Bonk and Angeli (2000) used Henri's coding scheme to "analyze 12 weeks of electronic collaboration for the purpose of constructing better guidelines on how computer conferencing can be analyzed while building upon Henri's existing framework" (p. 120). However, instead of using message as a unit of analysis, they used a paragraph. They analyzed the asynchronous discussions which were used to supplement an applied psychology graduate level course. The subjects were 20 master and doctoral students. The results showed that 70% of the student postings reflected deep cognitive processing.

Newman, Webb and Cochrane (1997) conducted an experimental study to compare evidence of critical thinking found in undergraduate face-to-face groups with asynchronous groups. They used a coding scheme based on Henri (1992). Their content analysis instrument contained 10 categories and for each category a number of positive

or negative indicators were formulated. They used themes as the unit of analysis. The units comprised phrases, sentences, paragraphs or messages illustrating at least one of the indicators. The findings revealed that both groups showed similar levels of critical thinking but the computer conferencing group showed greater depth.

Zhu (1996) used content analysis to examine negotiation and knowledge construction in a graduate level distance learning course. She used entire messages as the units of analysis. She divided social interaction into vertical interaction and horizontal interaction. The former occurs when "group members will concentrate on looking for the more capable members' desired answers rather than contribute to and construct knowledge'' and the latter when ''members' desires to express their ideas tend to be strong, because no authoritative correct answers are expected to come immediately'' (Zhu, 1996, p. 824). The results of the findings showed that most of the discussion fell into the categories of discussion, comment, reflection, information sharing, and scaffolding.

Using grounded theory approach, Gunawardena, Lowe and Anderson (1997) developed an interactive analysis model to examine the negotiation of meaning and the co-construction of knowledge of a group of professionals in the field of distance education. Content analysis was carried out on the debate transcript of the 5-day debate. In developing this model, Gunawardena et al. used Henri's interaction, cognitive and metacognitive categories as the starting point. The Interaction Analysis Model that they developed, describes the hierarchical phases in the co-construction of knowledge. It comprises five phases of knowledge co-construction which they believe characterize negotiation of meaning which "must occur when there are substantial areas of

inconsistency or disagreement to be resolved" (Gunawardena et al., 1997, p. 413). The phases moved from the lower to the higher mental functions i.e. beginning with Phase I: Sharing phase; Phase II: Discovery and exploration of dissonance; Phase III: Negotiation of meaning; Phase IV: Testing and modification of proposed synthesis or co-construction; and Phase V: Applications of newly-constructed meaning. Each phase was further characterized by specific operations which may occur at each stage of the process. The phases outlined in the model occur at both the individual and social level.

The purpose of the Interactive Analysis Model was to study the process by which the new pattern of knowledge was arrived at. Knowledge construction was made visible by studying the patterns of interaction. Hence, it was important to view the interaction as a whole in the sequence in which they occurred because they viewed interaction as "the totality of interconnected and mutually-responsive messages among the participants" (p. 407). Gunawardena et al. used the entire message as a unit of analysis, "which taken as a whole embodied the participant's cognitive activity and contribution to the construction of knowledge" (p. 416). Their emphasis was the evolutionary pattern of knowledge construction because they felt that the debate was evolving through a series of stages. They reported that the majority of the postings occurred at Phases II and III, which were the phases for the exploration of dissonance and the negotiation of meaning. When they tested the efficacy of the model in a second online model, they found that the debate consisted mostly of sharing and comparing of information.

Gunawardena et al. observed two important themes in their study. The first was the progress of certain strands of argument that moved through from Phase I to Phase V

which showed that the group was co-constructing knowledge. The second was that some messages contained more than one and sometimes three phases. This indicates how individuals developed in their thinking within the debate. This reveals that the Interactive Analysis Model shows how knowledge is constructed not only at the group level but also at the individual level.

Lally (2001) lists several important features of the Interactive Analysis Model in terms of understanding teaching and learning in networked collaborative learning environments. First, it focuses on interaction as the vehicle for the co-construction of knowledge. Second, it focuses on the overall pattern of knowledge construction emerging from a conference. Third, it is most appropriate in social constructivist and collaborative (student-centered) learning contexts. Fourth, it is a relatively straightforward schema. Finally, it is adaptable to a range of teaching and learning contexts.

In a study aimed at proposing a suitable instrument to analyze students' discourse in the online environment, Sringam and Geer (2001) used the Cognitive Development and Interactive Analysis Model. Their model is divided into behaviour analysis at the individual level, and interactive behaviour analysis at the group level. The former is based on Henri's theory of critical reasoning skills and the latter was based on Gunawardena et al.'s Interactive Analysis Model.

In a study carried out in 2005, Schellens and Valcke examined if working in asynchronous electronic discussion groups have an impact on cognitive processing. The subjects were 230 undergraduates that underwent a 12-week educational sciences course. They applied the coding scheme by Gunawardena et al. to study the online

discussions. The findings of their study showed that messages were situated in Phase 1: Sharing and comparing information and Phase 3: Negotiation and co-construction. There were almost no messages in Phase 4: Testing and adjusting new hypothesis and Phase 5: Application of newly-constructed meaning. Bearing in mind that the Interactive Analysis Model by Gunawardena et al. moved from the lower to the higher cognitive levels, this means that the results of Schellens and Valcke's study showed that the computer supported collaborative environment did not support higher phases of knowledge construction.

However, the results of the same study by Schellens and Valcke's were different when they simultaneously coded the online discussions using Veerman and Veldhuis-Diermanse's (2001) content analysis model. Veerman and Veldhuis-Diermanse distinguished between task-oriented and not-task-oriented behaviour. The task-oriented communication were categorized into three basic cognitive processing activities. Schellens and Valcke added hierarchical structure to the typology of task-related communication whereby consecutive types of communication represent higher levels of knowledge construction. It began with New idea: facts (Phase 1), New idea: experiences/opinions (Phase 2), New idea: theory (Phase 3), explication (Phase 4), and evaluation (Phase 5). They found that most of the messages were categorized in Phase 3 (evaluation messages) and Phase 5 (theory based messages). Based on Veerman and Veldhuis-Diermanse's model, the results of the study showed that online collaboration fostered high levels of knowledge construction. Although the data used were the same, the results were different for both models (Veerman & Veldhuis-Diermanse and Gunawaredena et al.).

It was an attempt by Schellens and Valcke (2005) to study the validity of the instruments by simultaneously coding the online discussions using the instruments of both Gunawardena et al. (1997) and Veerman & Veldhuis-Diermanse (2001). They discovered that Gunawardena et al.'s model lacks "discriminant capability of the instruments" which accounted for the large portions of the transcript being coded in few categories (p. 972). In addition, the coding scheme of Gunawardena et al. did not differentiate between lower cognitive processes but discriminated more advanced levels of knowledge construction.

Gerbic and Stacey (2005) note that while content analysis of computer transcripts is a rich source of data for understanding online learning, there are practical and methodological difficulties. This is demonstrated by the coding schemes used by Schellens and Valcke in their study. Gunawardena et al. (1997) also acknowledge that "it is difficult to arrive at an adequate judgment of the quality of an online learning experience by the application of a single method" (p.426). This is further corroborated by Thomson, Reeves-Lipscombe, Stuckey and Mentis (2007) when they observe that the selection of an appropriate tool was difficult in that different tools suit different interactive environments, a matter of "different horses for different discourses" (p. 1).

2.6 Studies on online collaboration carried out in Malaysia

According to Muhammad Kamarul and Mohamed Amin (2004) the number of studies focusing on online learning in Malaysia is limited. The limited research that has been done was mainly focused on whether OC helps in knowledge construction but

does not address the effects of OC on the performance of the participants nor does it address the patterns of interaction that lead to knowledge construction. Evidence of this is seen in past studies carried out by Malaysian researchers.

For instance, Lim (2009) examined how students pursuing a Masters degree in the Open University Malaysia, in a wholly online course in Instructional Design and Technology, interacted and collaborated in constructing knowledge through forum discussions. She used three analysis tools to investigate the roles and behaviour of the forum participants to understand how they engaged in knowledge construction. The results indicate that knowledge construction took place among the participants. However, the study did not address if the knowledge constructed during the course helped the students' performance in the Instructional Design and Technology course.

Likewise, Tiong and Khoo (2006) also carried out a case study to investigate the effect of using online collaborative learning activities on undergraduate students' learning specifically their ability to construct knowledge. The students who participated in their study were undergraduates enrolled in a Cognitive Psychology course from Universiti Malaysia Sarawak. Using Kanuka and Anderson's (1998) Model of Content Analysis to analyze the online transcripts, they found that knowledge construction took place as evidenced by the occurrences of the five phases of knowledge construction. Nevertheless, their study did not examine the effect of OC on the performance of students in the Cognitive Psychology course.

In an attempt to have a deeper understanding regarding the "inside" of collaborative learning process, Koo et al. (2009) investigated the online interaction that occurred among secondary school students during an online collaborative activity

known as Diary of Discovering Geometry. They analyzed the message flow, individual participation, content analysis and message act. Most of the messages were posted by the coordinators and few students participated actively. Using Mehan's (1979) speech act analysis, they found that the messages posted by the students were mainly "reply" act followed by "initiate" act. The "evaluate' act was the least used act. They conclude that the students' gain of knowledge in geometry was minimal based on their inability to demonstrate through online discussion, and interviews that they learnt geometry; to define the meaning of geometry; and to observe and report critically what kind of geometry concepts (shapes, areas, symmetry, etc) were used in their surrounding. However, their results were not statistically proven.

Like the study carried out by Koo et al., Sopiah and Merza (2006) also examined the effects of inquiry-based computer simulation with heterogeneous-ability cooperative learning (HACL) compared with inquiry-based computer simulation with friendship cooperative learning (FCL) on scientific reasoning and conceptual understanding in Physics among Form Four students in Malaysian Smart Schools. Moreover, they investigated the effects of the HACL and FCL methods on performance in scientific reasoning and conceptual understanding among students. Pretest and posttest were administered to gauge the students' performance. The findings show that the HACL group significantly outperformed the FCL group in scientific thinking and conceptual understanding. They conclude that for maximum effectiveness, cooperative learning groups should comprise students of heterogeneous abilities. Nevertheless, their study did not address the difference in the interaction that took place between the HACL and the FCL groups.

In a study on web-based synchronous collaboration, Fauziah et al. (2004) examined student-facilitator and student-student synchronous collaboration using the constructivist Problem-Based Learning (PBL) approach in a Physics course. Data were obtained from pre and post-treatment tests and questionnaires administered to the students before and after the PBL web-based learning environment. The quantitative analysis of the student-facilitator collaboration indicates that the scaffolding by the facilitator is important in supporting both interaction and self-reflection. The analysis of student-peer collaboration shows that students' task performance is enhanced due to the mutual exploration of learning issues, argumentation and weaving of ideas. However, the study did not report in what way the task performance was enhanced.

Another study that compared different types of collaboration, Norhayati et al. (2005) carried out a study comparing face-to-face collaboration with OC among students taking a course on Animal Diversity. A posttest was administered after the completion of a project. Results show that there is a significant difference between the groups in their posttest scores whereby the group that collaborated online obtained higher scores than the group that collaborated face-to-face. Although they discovered that both methods of instruction were found to be equally effective in gaining factual knowledge, they conclude that OCL fosters the development of higher order thinking skills and critical thinking through discussion, clarification of ideas, and evaluation of others' ideas. Like the other studies mentioned above, they did not report if there were differences in the interaction between OC and face-to face collaboration.

Besides comparing the benefits between OC and face-to-face collaboration on knowledge construction, there were studies that examined learner characteristics and

learner behaviours during OC. In a pilot study, Amelia and Mohamed Embi (2007) investigated the collaborative behaviours in an asynchronous networked learning community of a group of learners pursuing a Bachelor of Education (TESL) programme at the Open University in Malaysia. The online transcripts were collected and subjected to interaction analysis. The works of Johnson and Johnson (1996), Curtis and Lawson (2001) as well as Stacey (1999) were adapted to identify the students' collaborative behaviours in the online interaction. There were five main categories in the framework which included A: Preparation; B: Giving Contribution; C: Getting Input; D: Reflection/Monitoring; and E: Social Interaction. The results show that there is substantial evidence of collaborative learning behaviours present during the online interaction which are usually associated with the face-to-face CL. They suggest that OC is useful in helping students to construct knowledge and share common goals collectively.

A recent study carried out by Subramaniam, Abdullah and Sufian (2009) explored the learners' characteristics on critical thinking during online asynchronous CL. The undergraduate students were required to collaborate online in small groups using asynchronous threaded forum to solve a programming problem. The characteristics investigated were age, cumulative grade point average (CGPA), gender, their prior knowledge on the domain and location of their learning centers. The collaborative transcripts were analyzed for evidence of the critical thinking ratio using only the cognitive component of Garrison, Anderson, and Archer's (2001) Community of Inquiry framework. The results show that among the five variables of age, CGPA, students' prior proficiency level of the domain, gender and location of the learning

centre, only CGPA has shown marginal significance for the individual critical thinking ratio. They conclude that there are other factors that need to be considered to make asynchronous CL as effective as possible.

There have been a number of studies on CL and writing. Noraien (2007) explored the strategies of implementing email in an ESL writing classroom. She outlined how email can be implemented in a collaborative learning environment by incorporating the stages of writing process approach and pair work activity. Meanwhile, Leong (2006) in her doctoral thesis entitled, "Effects of Collaboration in an Online Environment on ESL Tertiary Students' Writing and Reflective Thinking" compared the effects of collaboration versus non-collaboration on students writing and reflective thinking. She found that the collaborative learning environment can be channelled to trigger students' reflective thinking to help them integrate and link ideas learnt at the surface level and to negotiate for meaning using higher order thinking skills.

2.7 Conclusion

This chapter reviews the theoretical and methodological issues related to OC. In general, available literature has established that the key underlying the notion of OC is that learning is a social enterprise. Many researchers view social interaction as the key to OCL. OC provides the opportunity for learners to participate in shared meaning making and knowledge building. Learners are given a platform to talk among

themselves and it is through this talk that learning occurs since learning is fundamentally a social process.

OC has made language learning even more challenging. Besides offering an alternative form of discourse, OC offers more opportunities for learners to interact in responsive, dynamic environments to support learning in an authentic context. The computer is seen as a mechanism to support social interaction and to modify the nature and the efficacy of this interaction. Because the computer captures the written nature of the discussion, learners' are able to attend to and reflect on the form and content of the communication. Besides that, the online discussion threads which capture the interaction among the participants facilitate the study of the CL processes which lead to the process of knowledge construction. Furthermore, the analysis of the online transcripts can help shed light on the effects of CL on the measures of individual learning.

Nevertheless, most research on language learning has so far focused on quantifying and categorizing the messages posted by learners rather than investigating how students negotiate for meaning with each other. Whilst there is nothing wrong with analyzing the data quantitatively, however, in light of the fact that if one were to study the process of knowledge construction, then quantitative analysis should be supported with qualitative analysis. The paucity of research that combined quantitative and qualitative analyses in the investigation of the patterns of interaction for examining knowledge construction among L2 learners is a good reason for more research in this area.

Research has shown that tasks have an effect on interaction and the negotiation of meaning. Whilst studies have described the effects of the different tasks on interaction, they did not address if these differences in the patterns of interaction were significant. Furthermore, there is a need to address the nature of the relationship between the patterns of interaction and the learners' performance. The information from such an investigation can have pedagogical implications in that it can inform the instructor on the type of tasks that best help in students' performance.

Another area that needs to be looked into is interaction analysis. Past research has shown that there is no one single method that can adequately illustrate the quality of an online learning experience. Different results were obtained when the same set of data were subjected to different instruments of analysis. Hence, the selection of an instrument for interaction analysis should take into consideration the interactive environment as well as the purpose of the research. The present literature review suggests that an adapted version of Gunawardena et al.'s (1997) Interaction Analysis Model is an efficient instrument.