CHAPTER 1

INTRODUCTION

1.1 Background to the study

With the fast-paced changes brought about by globalization and technological development, English language teachers need to understand the current socio-economic factors and their influence on English language teaching. The pervasive nature of technology and the possibilities it offers for communicative experience far beyond the classroom have drawn language educators to utilize it as a tool to facilitate language learning. Some of these modern tools which are helpful in facilitating language learning include laptop computers, smart phones, computer games and social networks such as Facebook and Twitter.

Besides the advent of technology, the socio-economic factors also influence language instruction and learning. As the developed world moves from the industrial age to the information age, economic activity and growth are based less on the input of labour and capital but more on the exchange and interpretation of information and the development of knowledge (Castells, 1996). Carnoy, Castells, Cohen and Cardoso (1993) further note that in the post industrial age, there will be increased inequality between those who control technological and media resources and those who lack technological access and know-how.

The new economic order has had a bearing on the teaching and learning of the English language. This is the result of the increased global contact brought about by the

networked society that places a premium on the ability to communicate (Council for Cultural Co-operation of the Council of Europe, 1975).

As globalization develops, employment patterns and technology are likely to further impact education, not least English language teaching and learning. Castells (2001) observes that the information age brought about by the developments of electronic networks have resulted in the emergence of a new form of global social organization, which he refers to as the "Networked Society". As a result, Castells questions the education system developed during the industrial era which focussed on the input of labour rather than on the exchange and interpretation of information and the development of knowledge. He highlights that current education should place emphasis on developing new skills such as information processing and analysis skills in the networked society (Castells, 2000). Reich (1991) added that these new skills should include skills of critical analysis, evaluation, communication and collaboration.

Wegerif (2006) posits that online collaborative learning (OCL) is the apparent pedagogic medium for this Networked Society. This accounts for the existing intense attention on online learning, especially on the role that online discussion groups can play in promoting interactivity and collaboration among learners (McKenzie & Murphy, 2000). According to Lipponen (2002), online collaboration (OC) "is focused on how collaborative learning supported by technology can enhance peer interaction and work in groups, and how collaboration and technology facilitate sharing and distributing of knowledge and expertise among community members" (p. 73). Meanwhile, Dillenbourg and Schneider (1995) describe OCL as situations in which two or more subjects interactively build a joint solution to some problems.

The value of OC is well documented in literature which shows that it supports and fosters effective learning (Ritchie & Hoffman, 1996), shared understanding and critical thinking (Garrison, Anderson, & Archer, 2001; Johnson & Johnson, 1999; Kreijns, Kirschner, & Jochems, 2003) and improved performance (Fauziah et al., 2004; Gokhale, 1995; Sopiah & Merza, 2006). More importantly, OCL is seen as a shared social activity which emphasizes on mutual engagements of participants in the development of collective understanding in the collaborative construction of knowledge (Gunawardena, Lowe & Anderson, 1997; Lazonder et al., 2003; Scardamalia & Bereiter, 2003; Stahl, 2005; Stahl, Koschmann & Suthers, 2006).

Central to OC is social interaction (Dixon, Dixon & Axmann, 2008; Dykes, 2001; Gunawardena et al., 1997; Kapur & Kinzer, 2007; Kreijns, Kirschner & Jochems, 2003; Schrire, 2006; Suthers et al., 2007) which is crucial to meaningful learning (Garrison & Anderson, 2003). Dewey (1916) observes that interaction is the fundamental component of the educational process that occurs when learners transform the inert information passed to them from another and constructs it into knowledge with personal application and value. The underlying assumption is that knowledge is created through interaction and not simply transferred. Similarly, Jonassen et al. (1995) point out that social interaction plays the most significant role in students' achievement of educational objectives. Hence, OC is important because it promotes social interaction which is critical to the negotiation of meaning and the collaborative construction of knowledge (Scardamalia & Bereiter, 2003; Stahl, 2005; Stahl, Koschmann & Suthers, 2006).

Kern and Warschauer (2000) observe that "the nature of interaction has been one of the most important areas of research in second language learning" (p.15). Language is best learned through interaction especially when learners negotiate toward comprehending each other's meanings (Krashen, 1981; Long, 1980; Pica, Kanagy & Falodun, 1993). The computer is considered to be an ideal medium for students to gain from interaction as the discussions posted online enable students to reflect on the form and content of the communication. Johnson (1991) called for computer-assisted language learning (CALL) research to take into consideration the social interactional environment because he observed that theory and research in second language acquisition (SLA) indicate that the social interactional environments of the classroom affect language learning. Moreover, he added that previous CALL chiefly concentrated on the cognitive aspects of learning. Similarly, Kern and Warschauer (2000) observe that there has been a lack of research which qualitatively analyzes how and in what ways students actually negotiate meaning with each other.

According to Cole and Wertsch (1998), knowledge emerges through the network of interactions and is distributed and mediated among those (humans and tools) interacting. According to Mynard (2004, as cited in Kabilan, 2009) OC can assist English language students to apply "a range of coping and comprehension strategies, make connections and observations, transfer learning from other contexts, and demonstrate an increasing degree of audience awareness" (p. 2). It is, therefore, useful to study the patterns of interaction which is for examining the social construction of knowledge among English as a second language (ESL) students during an online reading comprehension skills course.

Additionally, researchers have acknowledged that one of the effects of OC is that it can improve students' performance. However, most of these studies were based on students' perceptions of the quality of their performance (e.g. Fauziah et al. 2004; Picciano, 2002). Therefore, it is helpful to assess the effects of OC on students' performance (as characterized by their pretest and posttest, and reading scores). This would provide insights into how the knowledge that they have gained from interaction is translated into performance outcome that is measurable. This is important because this evaluation can determine the success of a course.

Therefore, OC is of interest because it can enhance peer interaction and facilitate the collaborative construction of knowledge (Gunawardena et al., 1997; Kapur & Kinzer, 2007; Kreijns, Kirschner & Jochems, 2003; Schrire, 2006; Suthers et al., 2007).

1.2   Theoretical background to the study

There has been a gradual shift in the perspectives on online language learning and teaching. Initially, between the 1960s and 1970s, computer-assisted language learning was based on the behaviourist perspective of learning whereby the emphasis was on structural methods of instruction and the audio-lingual method. In the late 1970s, the behaviourist perspective was criticized for being too mechanical and was challenged by the communicative perspective which placed emphasis on communicative use of language rather than on isolated sentences.

In the mid 1980s, proponents of the input perspectives on interaction view language learning as an outcome of participating in a discourse (Ellis, 2004). The emphasis of the interactionist approach is that language learning is dependent on the amount of comprehensible input that one receives. This was criticized by Warschauer (1997a) because the interactionist approach was not able to shed light on "how students learn through language… how they use language to learn important cultural knowledge or content matter, or how they use language to develop literate, critical thinking skills" (Discourses of Collaboration, ¶ 4). He further adds that the sociocultural perspective fills this gap because it highlights the role of social interaction in creating an environment to learn language, learn about language, and learn through language.

Therefore, it is not surprising that from the mid-1990s until the present, online language learning has been based on the sociocultural perspective of learning. From this perspective, learning was seen not only in terms of the changes in the learners' cognitive structures but also the social structure of their discourse and activity (Crook, 1994, p.78). Hence, the theoretical perspective of this study on OC is drawn from the sociocultural perspective of learning.

The three key concepts of sociocultural theory (SCT) of learning are social learning, mediation and genetic or developmental analysis (Wertsch, 1991). 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 (Lantolf, 2000). The sociocultural perspective of learning was derived in part from the theories of Vygotsky's (1978) zone of proximal development and Piaget's (1928) socio-cognitive conflict.

Vygotsky's (1978) SCT of learning emphasizes that learning takes place in a social context and that higher cognitive processes originate from social interactions. He sees collaborative learning (CL) as necessary to help students to advance through their zone of proximal development (ZPD). ZPD is described as the difference between what a learner can do independently without help and what the learner can do in collaboration with more capable peers. This means that learning in the ZPD takes place during collaboration.

During the process of co-constructing knowledge, thinking processes, reasoning patterns and problem-solving strategies become internalized. Internalization of these jointly constructed knowledge is accounted for by the process of verbal mediation (Forman & Kraker, 1985). According to Vygotsky (1978) aspects of the actual dialogue used during the interaction are internalized by the individual as inner speech, which is later used to guide the individual's own thinking and problem solving during subsequent similar tasks and activities, paving the way for individuals to engage in complex cognitive activities independently. Vygotsky conceptualized development as the transformation of socially shared activities into internalized processes. Vygotsky (1981) stressed the primacy of interaction in human development as occurring twice, once between people (interpsychological) and the other within self (intrapsychological). In other words, collaboration facilitates individual and group learning through mutual engagements and co-construction of knowledge.

According to Piaget (1928) socio-cognitive conflict arises when learners who have differing perspectives engage in social interaction. This results in a state of disequilibrium which would then require further interaction to resolve the conflict

resulting in the co-construction of knowledge. An equilibrium is thus established which is at a higher level of cognitive development (Forman & Cazden, 1985; Gilly, 1990; Tudge & Rogoff, 1989). Thus, the co-construction of knowledge takes place through the learner's 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. The implication of Vygotsky's ZPD and Piaget's socio-cognitive conflict is that learners of mixed abilities should work together to ensure effective collaboration.

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). CL is conceived as a shared social activity, which leads to the collaborative construction of knowledge (Scardamalia & Bereiter, 2003; Stahl, 2005; Stahl, Koschmann & Suthers, 2006). Seen from this perspective, OC refers to how technology supports CL and improves interaction which facilitates the sharing and distributing of knowledge (Lipponen, 2002). The key to OCL is social interaction (Dykes, 2001; Gunawardena et al., 1997; Kapur & Kinzer, 2007; Kreijns, Kirschner & Jochems, 2003; Schrire, 2006; Suthers et al., 2007).

Interaction is viewed as the fundamental component of the educational process (Dewey, 1916) the most significant role in students' achievement of educational objectives (Jonassen et al., 1995); and the component that is crucial for meaningful learning (Garrison & Anderson, 2003). Despite the fact that interaction plays a significant role in learning, there is no clear and precise definition of the term "interaction" in the education literature (Anderson, 2002). Regardless of the various

definitions of interaction (Bretz, 1983; Fahy et al., 2001; Henri, 1992; Gunawardena et al., 1997; Schrire, 2006; Stahl et al., 2006; Wagner, 1994), they have in common that interaction is essentially concerned with shared meaning making. Thus, the impetus for online collaborative research is to learn how interaction facilitates learning especially the co-construction of knowledge.

Besides social interaction, higher forms of mental activity are also mediated by artifacts like technology and tasks (Lantolf, 2000). Warschauer (1997a) adds that language is one of the most important mediation tools since all higher functions were seen as developing out of language-based social interaction. According to Vygotsky (1981) by including the tools in the process of behaviour, they could alter the entire flow and structure of mental functions. This means that CL supported by the computer has an effect on the interaction and the sharing and distributing of knowledge.

One reason for this is that computer technology enables the numerous configurations of interactions that can take place (Warschauer, 1997a). Shared discourse spaces and distributed interaction can offer multiple perspectives and ZPDs for students with varying knowledge and competencies. This is profitable when there is an eventual pooling or interchange of ideas among the students that broadens each student's perspective on the subject (Tiessen & Ward, 1997). In this way, computer technology provides for the multiperspectives called for in Piaget's (1928) theory of socio-cognitive conflict in which learning takes place due to a state of disequilibrium within participants, resulting in the construction of new conceptual structures and understanding. The online collaborative environments can also offer greater opportunities to share and solicit knowledge. Further, the database can function as a

collective memory for a learning community, storing the history of knowledge construction processes for revisions and future use (Lipponen, 2002).

Kern and Warschauer (2000) observe that, "… computer-mediated communication provides an ideal medium for students to benefit from interaction, since the written nature of the discussion allows greater opportunity to attend to and reflect on the form and content of the communication" (p. 15). Lotman (1988 as cited in Warschauer, 1997a) postulates that the written texts (the threaded discussions) are not just seen as links for conveying information, but rather as thinking devices used to collaboratively generate new meanings. This 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 higher mental functions during OC are mediated by the many attributes of the computer, especially that which permits distributed interactions that promote multiperspectives and ZPDs, and the written nature of discussion that allows for reflection and acts as thinking devices. In other words, the computer could alter the interactions and the co-construction of knowledge during OC.

Similar to technology, tasks too are seen as tools for constructing collaborative acts. 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." Pica et al. (1993) also note that tasks are goal-oriented activities which participants must perform

in order to arrive at an outcome. To achieve the outcome, the participants have to structure and sequence their interactions. Therefore, tasks are tools that promote interaction and the process of negotiating for meaning for language learning.

Based on Vygotsky's ZPD, tasks must be structured such that they create an appropriate challenge that requires learners to perform functions and use language that enable them to construct ZPD (Ellis, 2004). To accomplish their tasks, learners are involved in collaborative dialogue whereby they are engaged in problem solving and knowledge building. The tasks enable them to identify and provide assistance to each other and at the same time help them to create their ZPD. In other words, the construction of knowledge occurs when learners use the language to jointly address a problem, and respond to the language forms that arise in the utterances that they produce (Ellis, 2004).

Since tasks are seen as tools for constructing collaborative acts, this means that tasks have an effect on interaction and the negotiation of meaning (Ellis, 2004; Pica et al., 1993). Information exchange (required or optional) and task outcomes affect the quantity (Nakahama, Tyler & van Lier, 2001; Newton, 1991; Pica & Doughty, 1985; Smith, 2003) and quality (Newton, 1991) of negotiation. Furthermore, the level of difficulty of the tasks also affect the amount of negotiation generated (Anderson & Lynch, 1988; Nunan, 1989; Pellettieri, 2000; Pica et al., 1993). In addition, where tasks are carried out (online or in the classroom) also have an effect on the interaction and negotiation that takes place (Chun, 1994; Kern, 1995; Smith, 2003; Warschauer, 1996).

Therefore, task types and the task environment (where the tasks are carried out) have an effect on the interaction and negotiation of meaning during collaboration.

Hence, it is useful to examine the online interaction that takes place under different task types. It would yield information regarding the patterns of interaction in relation to the task types. Moreover, Appel and Lantolf (1994) point out that performance depends crucially on the interaction of the individual and task and not so much the task itself. This provides more impetus to study the nature of the relationship between the patterns of interaction (as a result of different task types) and the performance of the students during OC.

Another tenet of the SCT is genetic analysis which stresses that in order to understand the many features of mental functioning, it is important to understand their origins and transition they went through. Vygotsky (1978) states that the emphasis of genetic analysis is not so much the product of development but rather the very process by which higher forms are established. He uses the dialectical approach to study the way concepts are learned and the processes through which they are acquired, appropriated, or internalized.

Online collaboration facilitates the study of the changing and evolving nature of the cognitive state. Currently, many studies on online collaboration have focused towards examining the complexities of interactional dynamics during group processes (De Wever et al., 2006; Kapur, Voiklis & Kinzer, 2008; Kreijns et al., 2003; Lazonder et al., 2003; Schellens et al., 2007). The study of group processes is made possible because the data are confined in the online transcripts which capture the written nature of the students' discussions (Macdonald, 2003).

Garrison et al. (2006) suggest using transcript analysis to explore the complexities of online learning. According to Wertsch (1994) online discussions

support the study of group processes during collaboration because it makes visible how knowledge emerges through interactions. This is because students make explicit their ideas in the process of articulating, justifying and defending their approach to a shared task during OC. Therefore, data from the online transcripts are useful for a number of purposes but of concern to this study is that they enable the study of the process of how meaning is negotiated and knowledge is constructed (Gunawardena, Lowe, & Anderson, 1997; Gunawardena, Carabajal, & Lowe, 2001).

According to Lazonder et al. (2003) content analysis or interaction analysis of computer transcripts is crucial to assessing the quality and process of the learning experience in the online environment particularly in examining how meaning is negotiated and knowledge is co-constructed. De Wever et al. (2006) state that the aim of content analysis is to make known the latent content i.e. information found below the surface, of the online transcripts. Meanwhile, Schwandt (2001) observes that content analysis is a generic name for a variety of textual analyses that involves comparing, contrasting, and categorizing a set of data. He further adds that content analysis can involve both numeric and interpretive data analyses. It is, therefore, profitable to use content analysis to study the patterns of interaction for examining the process of knowledge construction.

1.3   Rationale for the study

The call to action for this study was spurred by the rapid development of computer technology which has enabled alternative modes of delivery of teaching,

which has greatly influenced language teaching and learning. Long and Richards (2000) note that the Internet which is a new medium of communication, has facilitated new opportunities for various communication configuration between language teachers and learners. They further add that this new medium of communication can shape both the processes and the products of communication. Because of the great potential in using computer in language learning, online learning has become an important component of the language learning pedagogy. Therefore, it is important to investigate the influence of computers on language learning.

In addition, the current socio-economic factors which has a great bearing on English Language teaching and learning, has inevitably resulted in the shifting aims of learning the English Language. Graddol (2000) predicts that "the English language skills formerly taught to university students may no longer be sufficient to meet the needs of new enterprises" (p.45). The shift in the global information-based economies means a dramatic increase in the need to deal with large amounts of information and to communicate across languages and cultures. Warschauer (2000) posits that the new skills include teaching students to critically interpret and analyze information in English and carry out complex negotiations and collaboration in English. Taking heed of Warschauer's observation, this research undertook the study of OC of ESL students.

The efficacy of OC to foster learning and co-construction of knowledge has been well documented in literature (Clark et al., 2003; Gunawardena, Lowe & Anderson, 1997; Lazonder et al., 2003; Scardamalia & Bereiter, 2003; Stahl, 2005; Stahl, Koschmann & Suthers, 2006). Cole and Wertsch (1998) posit that knowledge emerges through the network of interactions and is distributed and mediated among

those (humans and tools) interacting. According to Pea (1993) knowledge construction is seen as a social, dialogical process in which different perspectives are incorporated. This emphasis on shared meaning making and learning has prompted calls to focus work in this area (Koschman, 2002; Suthers, 2006; Stahl, 2006). Pena-Shaff et al. (2004) reiterate that to discover whether OC can encourage the process of knowledge construction, it is important to analyze both the content of the messages and the patterns of interaction. Furthermore, Naidu and Jarvela (2006) add that by analyzing online interactions, it would provide insights into the processes of collaborative learning and to shed light on what constitutes productive collaborative activity. Hence, in response to these calls, this study examined the patterns of interaction in order to understand how ESL students co-construct knowledge during OC.

Previous research on online collaboration focused on quantifying students' rates of participation and interaction (e.g. Harasim, 1990; Henri, 1992; Hiltz, 1990; Pena-Shaff, 2004) and questionnaires or surface level characteristics of the communication (e.g. Harasim, Hiltz, Teles, & Turoff, 1995). Critics observe that these quantitative methods are not able to enlighten the process or the quality of learning taking place (Henri, 1992; Mason, 1992; Meyer, 2004; Pena-Shaff, 2004; Strijbos et al., 2006). Henri (1992) and Hillman (1999) advise paying attention to the quality of the learning and of the learning interaction. Content analysis of computer transcripts is seen to provide a rich source of data (Gerbic & Stacey, 2006) for researching and understanding online learning because of its ability to "capture the richness of student interaction" (Hara, Bonk & Angeli, 2000, p.119). De Wever et al. (2006) further add that content analysis reveals "information that is not situated at the surface of the

transcripts" and is able to "provide convincing evidence about the learning and the knowledge construction that is taking place, in-depth understanding of the online discussions is needed" (p. 7). Hence, this study took heed of Gerbic and Stacey, and Hara et al.'s recommendations on the use of content analysis or interaction analysis of the online transcripts to study how ESL students negotiate for meaning and co-construct knowledge during an online reading comprehension skill course. The instrument used for this study was an adapted version of Gunawardena et al.'s (1997) Interactive Analysis Model. They developed the model to study the process of knowledge construction which was made visible by studying the patterns of interaction. An added value of the model is that it reveals how knowledge is constructed not only at the group level but also at the individual level.

Henri (1992) argues for qualitative analysis in online research as it elucidates the process of student learning which quantitative analysis and student feedback are unable to provide. However, according to Mason (1992 as cited in Schrire, 2006, p. 51) the weakness of qualitative studies is that they may be "value-laden" but are not "generalizable to other situations and not easily replicable." This view is also endorsed by Suthers et al. (2007). On the other hand, Mason notes that quantitative methodology does not reveal the intricacy of the group interactions involved. Suthers et al. (2007) further add that the "coding and counting" of participants' contributions obscure the sequential structure of the interaction, which qualitative analysis is able to attend to. Nevertheless, they acknowledge the strength of using statistical methods namely that "a coding scheme is a concrete classification of behaviors that supports mathematical methods for estimating consistency (reliability) between multiple analysts" and that

"the approach has well-defined statistical methods for comparing results from multiple sources of data" (p. 696). However, Gerbic and Stacey (2005) and Campos (2004) observe that many studies on content analysis purporting to be quantitative actually used qualitative analyses to code the messages followed by quantitative analyses. This study used both qualitative and quantitative analyses as a complement to each other rather than viewing them as opposites. Qualitative analyses were used to identify and code the online transcripts for the patterns of interaction in order to examine the negotiation of meaning and the co-construction of knowledge. Then the results of the qualitative analyses were quantitatively analyzed to look for the patterns of interaction. Moreover, both quantitative and qualitative analyses of the data allow for the examination of the relationship between the variables in the study.

According to Ellis (2004) and Pica et al. (1993) tasks affect interaction and the negotiation of meaning. Collaboration with different computer-based tasks and activities may produce very different interactions and learning outcomes (Dillenbourg et al., 1996). Appel and Lantolf (1994) reiterate that performance depends crucially on the interaction of the individual and task. Due to the importance of the role of the tasks in CL, this study investigated if there were differences in the patterns of interaction when ESL students worked on different reading tasks. Additionally, this study examined patterns of interaction with different reading tasks, in relation to the reading performance of ESL students.

Strijbos et al. (2006) point out that "the quality of group performance (product or grade) provides no insight into the actual collaborative process and contextual factors that affect collaboration" (p. 30). Nevertheless, the inclusion of performance as

the effect of OC in the study was prompted by Picciano (2002) who observes that regardless of the many reasons for studying interaction which can support productive learning, "Ultimately, however, student performance outcomes need to be evaluated to determine the overall success of a course" (p. 24). In this study performance was measured by ESL students' reading scores before and after online collaboration, as grades and their derivatives are viewed as common student performance measures (Picciano, 2002). This further reinforces the need to include the investigation of the effect of OC on ESL students' reading performance, as well as to explore relationship between the patterns of interaction under different task types and the students' reading performance.

Despite the implementation of the technology-supported Smart Schools in Malaysia since 1997, there has been a paucity of research carried out in the area of OC (Muhammad Kamarul & Mohamed Amin, 2004). A couple of studies examined whether knowledge construction took place during OC (Lim, 2009; Tiong & Khoo, 2006; Koo et al., 2009). Nevertheless, they did not explore the patterns of interaction and the effects of OC on students' performance. In addition, most of these studies were carried out on courses other than ESL such as Instructional Design and Technology course (Lim, 2009); Cognitive Psychology (Tiong & Khoo); and geometry (Koo, et al, 2009). Studies on patterns of interaction among ESL students during OC seem limited. Moreover, these studies did not consider the relationship between the patterns of interaction and student performance.

The above are some of the reasons for this study on the patterns of interaction and reading performance among ESL students during OC.

1.4 The proposed study

The main purpose of this study was to examine the patterns of interaction and reading performance of ESL students during online collaboration. This was further guided by four objectives. Firstly, it investigated the effects of online collaboration on the reading performance of ESL students. Secondly, it examined the patterns of interaction demonstrated by ESL students when they collaborate online. Thirdly, it explored the differences in the patterns of interaction when ESL students worked on different reading tasks during online collaboration. Lastly, it sought to discover the nature of the relationship between the patterns of interaction and the reading performance of ESL students when they collaborate online.

Patterns of interaction refer to the online contributions of the participants which are analyzed for the four phases of knowledge co-construction. The four interactive phases (Phases 1- IV) are characterized by specific operations in each phase (adapted from Gunawardena et al., 1997; Sringam & Geer, 2001). The effects of OC in this study are measured by ESL students' reading performance. Reading performance in this study is measured through ESL students' pretest and posttest scores, and the scores of reading tasks before and after OC. A task refers to 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 (Lee, 2000).

This study involved an intact ESL class who were enrolled in the Degree in Bachelor of Accountancy programme in a local university. The OC course that the ESL students registered for was "Reading for Academic Purposes" which primarily focused

on reading comprehension skills. In line with the objectives of this study, the data collection process was guided by the following research questions:

1   What are the effects of online collaboration on reading performance of ESL students?

2   What is the pattern of interaction demonstrated by ESL students when they collaborate online?

3   What are differences in the patterns of interaction when ESL students work on different reading tasks collaboratively online?

4   What is the nature of the relationship between the patterns of interaction and the reading performance of ESL students when they collaborate online?

1.5   Significance of the study

This study is significant in various aspects. This investigation contributes to knowledge concerning the effects of OCL on ESL students' reading performance. This study on the patterns of interaction can also facilitate our understanding of the knowledge construction process during OC. Moreover, studying the interactive processes in relation to different reading tasks can create awareness regarding the knowledge construction process under different task types. Additionally, findings on the relationship between reading performance and the patterns of interaction when ESL students worked on different reading tasks can shed light on the types of reading tasks that can optimize students' reading performance.

From the perspective of the efficacy of OC, this study offers insights into the effects of OC on the reading performance of ESL students. By examining the pretest and posttest scores as well as the reading scores before and after OC, this study is able to identify the level of cognitive gain attained by ESL students. This is noteworthy because most studies on OC depend on participants' evaluation of conference success (Harasim, 1993; Hiltz, 1986). Additionally, some studies in Malaysia assess the efficacy of OC based on whether knowledge building took place (Lim, 2009; Tiong & Khoo, 2006; Koo et al., 2009) but did not explore if the knowledge gained were translated into product or grades.

From the perspective of interactive processes, this study is significant in that it provides an in-depth study of the patterns of interaction for examining knowledge construction among ESL students during OC. This is particularly so, when the patterns of interaction are investigated in relation to different reading tasks, a variable which is not much explored in CALL. Furthermore, the patterns of interaction of ESL students when they work on different reading tasks are also examined in relation to the reading performance. By incorporating these variables, this study may widen the scope of research on the patterns of interaction in CALL particularly on how ESL students can improve their reading comprehension skills via online interaction. This study may also spur further research which includes these variables.

This investigation has important pedagogical implication for the teaching and learning of the English language, particularly for instructional design as well as the design of the learning tasks. This study which identifies the levels of cognitive gains ESL students achieve during the OC, can aid language instructors to better design

courses which can optimize students' cognitive gains. Furthermore, this study also identifies the differences in the patterns of interaction in relation to the different tasks which could provide language instructors with insights as to which tasks would best suit the objectives of their study. Besides, the findings on the nature of the relationship between reading performance and patterns of interaction can assist language instructors to better design tasks that can lead to better reading performance.

Finally, from the research point of view, it is hoped that this study will prompt other researchers to carry out investigation on OC to promote learning in other Malaysian and Asian contexts. The results of this study may be of benefit to other researchers in helping them to transfer what may be applicable to their study. This is because there are many variables that affect the interactive process.

1.6   Definition of terms used in this study

The following are the operational definitions of some terms used in this study.

1   Collaborative learning refers to a coordinated activity that is a result of a continued attempt to construct and maintain a shared concept of a problem (Roschelle & Teasley, 1995).

2   Online collaboration refers to collaborative learning supported by technology which can enhance peer interaction to facilitate sharing and distributing of knowledge and expertise among community members (adapted from Lipponen, 2002).

3   Interaction refers to the totality of interconnected and mutually-responsive messages through which negotiation of meaning and co-construction of knowledge occurs. It covers the "entire gestalt formed by the online communications among the participants" during the online discussion (adapted from Gunawardena et al., 1997, p. 407).

4   Patterns of interaction refer to the online contributions of the participants which are analyzed for the four phases of knowledge co-construction. The four interactive phases (Phases 1- IV) are characterized by specific operations in each phase (adapted from Gunawardena et al., 1997; Sringam & Geer, 2001).

5   The effects of online collaboration in this study are measured by ESL students' reading performance.

6   Reading performance in this study is measured through ESL students' pretest and posttest scores, and the scores of reading tasks before and after online collaboration.

7   A task refers to 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 (Lee, 2000).