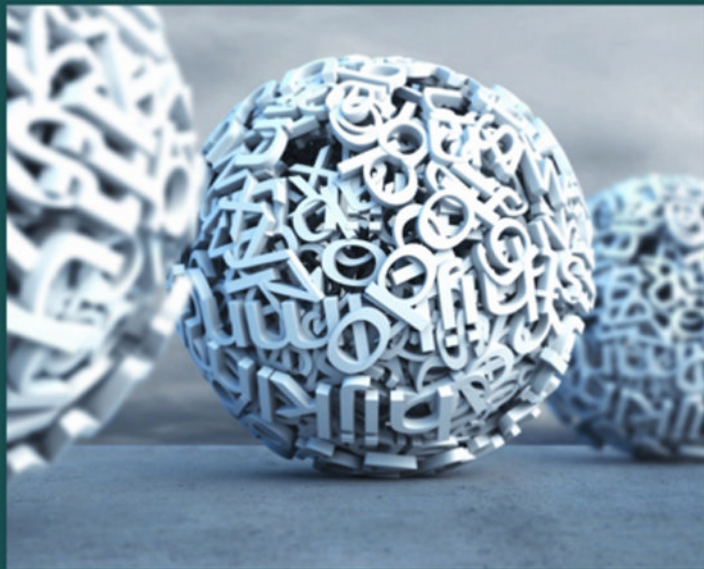


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Computer-Enhanced and Mobile-Assisted Language Learning

Emerging Issues and Trends



Felicia Zhang

Computer–Enhanced and Mobile–Assisted Language Learning: Emerging Issues and Trends

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Preface

Since the publication of the *Handbook of Research on Computer-Enhanced Language Acquisition and Learning* in 2008, information communication technology (ICT) has continued to create new learning paths to assist language learning. While CD-ROMs, multimedia computer labs, the World Wide Web, e-mail, and SMS still play an important part in language learning, research into the use of Web 2.0 technology (Fitzgerald, Barrass, Campbell, Hinton, Ryan, Whitelaw, Bruns, Miles, Steele, & McGinness, 2009) and Mobile Assisted Language Learning (MALL) have become increasingly common. However, as pointed out by Kukulska-Hulme and Shield (2008), while mobile phones, PDAs, and other handheld devices such as iPods are frequently used devices in mobile learning, research in this area has been geared towards creating learning content for mobile devices rather than investigating how mobile devices can support listening and speaking activities. Therefore, research in the areas of contribution made by Web 2.0 and mobile technology to language teaching and learning is still in their infancy.

Computer-Enhanced and Mobile-Assisted Language Learning: Emerging Issues and Trends will be most helpful as it will provide a comprehensive coverage of successful translation of language learning designs utilizing ICT and mobile technology in practical learning contexts. This important new follow-up publication will be distributed worldwide among academic and professional institutions and will be instrumental in providing researchers, scholars, students, and professionals access to the latest knowledge related to research on computer-enhanced and mobile assisted language learning. Contributions to this important publication have been received from scholars with notable research portfolios and expertise throughout the world.

THE IMPORTANCE OF THE CHAPTER SUBMISSIONS

The chapter submissions in this volume include many cases of successful international collaborations. In order to provide the best balanced coverage of research related to the selected topics of this handbook, researchers from around the world were asked to submit proposals. All proposals were carefully reviewed by the editor in light of their suitability, researcher's records of similar work in the area of the proposed topics, and the best proposal for topics with multiple proposals. Researchers were asked to submit proposal according to the recommendation made by Mosteller, Nave, and Miech (2004, p.33) for structured abstracts. Upon the receipt of full entry submissions, each submission was forwarded to at least two expert external reviewers on a double-blind, peer review basis. Only submissions with strong and favorable reviews were selected for the handbook. In many cases, submissions were sent back for several revisions prior to final acceptance. As a result, this handbook includes 12 chapters highlighting

current research conducted in the field of computer-enhanced and mobile language learning. The 12 submissions came from knowledgeable researchers around the world; while many submissions from the US were accepted (4 chapters), 4 chapters came from Australia, 2 from Thailand, 1 from Poland, and 1 from Denmark. Contributions involved a variety of contexts including such as tertiary education and schools. While the majority of the chapters involved empirical studies in the implementation of ICT and mobile technology for language learning, chapters that describe innovative use of mobile technology such as iPods, iPad, and Livescribe Smart Pen have also been included.

Heeding the inadequacies summarized by Hubbard (2005) and outlined previously, many of the chapters selected for publication are longitudinal in nature and employ both quantitative and qualitative evaluation instruments. In these chapters, whether ICT has been integrated within the overall design of the methodology used in the language learning process is a key factor. The international nature of this volume is demonstrated by the inclusion of many chapters that report on the learning of Thai, German, French, and English in foreign language learning contexts.

The diverse and comprehensive coverage of the interaction between language learning, ICT, and mobile language learning in this authoritative handbook will contribute to our understanding of how ICT can be successfully implemented in a variety of language learning contexts. The coverage of this handbook provides strength to this reference resource for language professionals who seek inspiration and new ideas to implement in their classrooms; equally, it is useful for researchers in applied linguistics who might want to replicate some of the studies reported in this handbook. For computer scientists, this handbook can also provide information on how to translate products from computer sciences to real life language learning contexts. It is our sincere hope that this publication and its great amount of information and research will assist our research colleagues or faculty, their students, and our organizational decision makers in enhancing their understanding of the language teaching and computer-enhanced language learning and acquisition fields.

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Most of the authors of chapters included in this book served as referees for the chapters written by other authors. Thanks go to all those who provided constructive and comprehensive reviews. Special thanks go to the publishing team at IGI Global, whose contributions throughout the whole process, from inception of the initial idea through to final publication, were invaluable. In particular, we want to thank Ms Hannah Abelbeck who helped keep the project on schedule, and who gave valuable timely assistance with detailed advice.

The editors also need to acknowledge with gratitude the encouragement, patience and understanding of my partner, Dr. Chris McMahon, he as well as our other family members made sacrifices in order to leave us with the time and energy to carry out the variety of tasks involved in putting this book together. Without the support of them all this book would have remained simply a good idea.

In closing, we wish to thank all of the authors for their valuable and interesting insights. As contributors you have helped us extend our knowledge in this field. We trust that our readers also, will find themselves on an exciting journey of learning as they make their way through this book.

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Chapter 1

Principles and Guidelines for Task Design in CMC Learning

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ABSTRACT

The goal of this chapter is to describe principles and guidelines that are to serve course designers and materials developers as a guide to task design in computer-mediated communication (CMC) learning environments. Drawing on cognitive and sociocultural perspectives, it argues that in task design it is imperative to bring into alignment a range of factors, such as the linguistic and cognitive complexity of the content, goals and outcome, processing conditions, and number of participants, in order to maximize targeted outcomes. The chapter is divided into three sections: First, a brief overview of theoretical perspectives and different design variables is provided. Second, different guidelines that are based on current research on CMC task effects are discussed. Last, the chapter concludes in the appendix with the description of rationales and procedures for 11 different task configurations that are to serve as prototypes and illustrate how task effects can be maximized in CMC-based online language learning.

INTRODUCTION

In the last decade, a steady increase in the use of the Internet for language teaching and learning has led researchers to investigate the effects of a range of different task designs which can be implemented in that medium. One type of activity that has received

much attention in particular is computer-mediated communication (CMC). This should be no great surprise, as CMC has become a well-established form of online communication. As such, CMC emphasizes interaction among learners, which is seen as a fundamental component for second language acquisition. While research informs us on the effects of a variety of particular task types, the findings from such research allow us to

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extrapolate information regarding the design and effects of similar task types. What is not always obvious, however, is how and to what degree tasks impact learner behavior and learning, in particular, if one or more task variables are modified or variables are combined in different ways. Hence, when designing tasks it is imperative to take into account a range of factors, such as the linguistic and cognitive complexity of the content, the goal and outcome that learners are to achieve, the processing condition under which students operate, and also whether learners interact with one or multiple partners. Only by bringing different design variables into alignment, targeted learner outcomes can be optimized. Regarding task design for CMC-based learning environments, questions that arise are: How do different task types such as jigsaws, decision-making, or open-ended designs affect learner performance? What are the effects, if the mode of interaction is switched from a synchronous to an asynchronous environment? What is the impact, if students interact in dyads or in larger groups? Moreover, how does the contextual support of a task (e.g., the use of images or texts, whether a task is structured or unstructured) influence learner performance?

Aiming at course designers and materials developers, the purpose of this article is threefold: 1. I will provide a brief overview of theoretical perspectives and different design variables underlying research in CMC. 2. Drawing on current research on CMC tasks, I will present different guidelines that are to aid in understanding task effects and designing tasks in CMC environments. 3. I will describe the rationales and procedures for 11 different task configurations that are to serve as prototypes and illustrate how task effects can be optimized in CMC-based online language learning.

THEORETICAL PERSPECTIVES TO RESEARCH IN CMC-BASED LEARNING

Research claims that task-based instruction is conducive to second language learning. In particular, the following theoretical perspectives are believed to contribute to its effectiveness. These include: the interaction perspective, the sociocultural perspective, the output perspective, and the cognitive perspective.

The Interaction Hypothesis

The questions ‘what drives interactions and negotiations’, and ‘what task types yield the highest language output among learners’ have received the most attention in research on CMC. This is no surprise, as answers to these questions touch the core of the Interaction Hypothesis (Long, 1983), which claims that meaningful negotiations among learners are conducive to SLA. The basis for this research has its roots in the interactionist theory which “views language learning as an outcome of participating in discourse, in particular face-to-face interaction” (Ellis, 2003, p. 78). The underlying hypothesis for this theory is that if learners are given opportunities to negotiate meaning, learners will benefit in several principled ways (see Pica 1992, 1994). As Ellis (2003) points out, “there is considerable empirical support for the claim that negotiation facilitates comprehension” (p. 79). First, it helps learners to obtain comprehensible input. Second, as suggested by Pica (1992, 1994), negotiations provide learners with feedback on their own use of L2, assuming more competent speakers respond in meaningful ways to less competent speakers.

Despite its benefits, the Interaction Hypothesis is not without its controversies. Skehan and Foster (2001) have noted “learners are often able to overcome their communication problems without necessarily negotiating for meaning” (p. 187). For example, in CMC setups students may bypass the

challenges by reverting to English or giving up (see Brandl, in press). Furthermore, researchers from this theoretical perspective have failed so far to provide convincing evidence that there might indeed be a link between negotiation for meaning and second language acquisition (Skehan & Foster, 2001; Swain, 2000). In fact, Sato (1990) argued, “it appears doubtful that conversational interaction is sufficient for learners to develop the full range of morphosyntactic structures comprising the L2 system” (p. 118).

The Sociocultural Perspective

Sociocultural theory posits that it is social interaction rather through individual effort, which is the primary force driving student language learning (see Vygotsky, 1986). By working together, the learners are able to co-construct knowledge as well as create new meaning. Furthermore, through dialogic interaction students become enabled, achieving tasks jointly that they otherwise would not be able to complete on their own. As Shedadeh (2005) puts it, “when individual people interact with each other cognitive processes awaken” (p. 24). It is assumed that what is learned in the process of assisted help and social interaction not only impacts but also has a lasting effect on the individual’s mental system (see LaPierre, 1994; Swain, 1997, 1998). Given these claims, there seems to be little dispute about the potential benefits of collaboration on learning in computer-mediated interaction (CMC). For example, there is evidence that students use metatalk in L1 or private speech to talk about linguistic features. In addition, students have also been observed in synchronous CMC providing peer-corrections (see Sotillo, 2000), which must be viewed as positive. Nevertheless, while interaction and collaboration in a target language function as a driving force for learning, it is not quite clear yet, to what degree collaboration supports learners in noticing L2 features and also impacts morphosyntactic

structures, in particular without the presence of a knowledge expert.

The Output Hypothesis

The output hypothesis proposes that through the act of verbalization additional learning occurs. Drawing on the work by Swain (1998, 2000) and Izumi (2002), Shedadeh (2005) frames output the following way: “...output is not just a product of acquisition that has already taken place or a means by which to practice one’s language for greater fluency, but it rather plays a potentially important role in the acquisition process” (p. 22). Producing language is not just a sign of acquired knowledge but also a sign of learning at work. By being forced to produce language, or as Swain coined it, to “push output”, learners notice the gap between what they can say and want to say. As a result, they are prompted to fill the gap (Shedadeh, 2005), and by doing so, they stretch their own interlanguage capacity, which enables them to internalize linguistic knowledge (Swain, 1995).

Similar to negotiating meaning, being placed into situations that require learners to produce comprehensible output gives them an opportunity to test out hypotheses about the target language and to reflect consciously on the language they are producing (Swain, 1998).

The Cognitive Perspective

Unlike the other theoretical approaches mentioned above, this framework posits that task characteristics and performance demands, e.g., as imposed by linguistic and cognitive complexity, and conditions under which tasks are performed, have an effect on outcome and thus the development of accuracy and fluency. This triadic framework, which was originally proposed by Candlin (1987) and further advanced by Skehan (1996) and Robinson (2001a, 2001b), takes into account a range of variables that play a role in processing information and transacting the task. For example, the complexity of input

is determined by the complexity of the linguistic code (e.g., range of vocabulary, language structures), the modality (e.g., aural, textual, imaginal), the number of details, clarity of information and textual organization (e.g., abstract or concrete), the learner's familiarity with the topic and task, and previous practice, structural support (e.g., prompts and cues), the amount of computation, and whether it is embedded in the task assignment (here and now) or needs to be retrieved from memory (there and then). The task transaction is also influenced by factors such as expected outcome (e.g., type of discourse such as descriptions, narrations, short statements), and whether it occurs orally or in writing. Last, the third area, communicative stress, is concerned with how the interactive and conditional demands of a task affect performance. The number of people involved during group interactions, familiarity with people, time pressure, and if there is something at stake in the outcome (e.g., a learner's performance is evaluated) is believed to have an impact.

In light of this theory, what must be done is to discover what task-types, variables and dimensions promote fluency, accuracy or complexity in L2 learners and to come up with specific configurations accordingly.

Task Types, Variables, and Dimensions

When designing and selecting tasks for use in online learning, instructors have a number of choices to make regarding the type of task, the conditions under which students complete the task and its characteristics. These options affect learner behavior in different ways and some will be more effective than others. Information about significant task variables can assist teachers and task designers in deciding what tasks to use and when and how to arrange optimal task configurations.

Task types can be identified in different ways. For example, Nunan (1989) suggests two broad categories: real world tasks (such as ordering

food) and pedagogic tasks (such as information gap activities). Communicative tasks also have been classified by a variety of subcategories. Some of these look at outcome, whether it is open or closed (sometimes called divergent or convergent tasks). Tasks with a closed outcome can be further divided in those that have a solution that consists of one or multiple parts. Pica, Kanagy and Falodun (1993) also distinguish tasks by considering at the starting point the type of interaction that occurs during task completion, e.g., is the information flow one-way or two-way, or is the information held by one or many, such as in jigsaws. Other distinguishing factors have to do with the source of the information that is to be exchanged, i.e., whether the information is based on learners' personal experience or opinions (e.g., opinion-based activities) or on an external source (e.g., information-based activities), whether the information is required or optional, and the goal that is to be completed (e.g., decision-making and problem-solving tasks).

In addition to types, tasks can be analyzed based on characteristics that make a task difficult and complex. These variables have to do with task inherent factors, e.g., input that has to be processed, and expected outcomes. One can also look at task independent factors such as learner familiarity with task types and the influence of preparation. In addition, there are task conditions that may enhance or reduce performance demands. For example, computer-mediated communication tasks can be designed so they involve interactions between two or multiple participants. In addition, interactants may communicate synchronously or asynchronously.

Effects of Task Design Factors in CMC Environments

The following section proposes a set of guidelines that are aimed at aiding task designs in CMC environments. Each guideline is discussed in detail and supported by a critical analysis of empirical

research on task effects in CMC environments. The section concludes with a range of 11 different tasks that illustrate how task variables can be configured in different ways to optimize different effects. For each task, a rationale for its design and implementation, and procedural descriptions are provided.

Create the Need for Interaction

CMC distinguishes itself from face-to-face communication in many ways. Students communicate in writing, which involves additional and different processes, such as typing and spelling. On the other hand, learners have more control of time, and the processing of written input allows for recursive processing. The form of discourse is also different. For example, by asking questions and providing answers, students have the option to post and answer multiple questions. As a result, CMC may result in fewer interactions and affect how and what learners say. The question that arises is how can the need for interactions in a CMC environment be maximized?

One particular way to achieve this is to design tasks that require interaction, and entice learners into taking multiple turns at interaction. It has also been suggested that tasks, which potentially allow for misunderstandings may trigger additional follow-ups by requiring further clarifications (see Long, 1983; Pica, 1992).

Research has shown that tasks that have the highest potential for achieving this goal are tasks that require learners to solve a problem by putting together information held by different students. Such tasks are commonly known as jigsaws. The nature of jigsaw designs embed the need to interact, and open the door for subsequent negotiations depending on the information being exchanged. As shown by Blake (2000), jigsaw tasks whose design required the learners to share particular information yielded more negotiations than two-way tasks that left the decision of how much information to share up the learner.

Online jigsaw designs have several advantages in comparison to jigsaw tasks that are implemented in classroom settings. For example, they allow students to access audio and video-based input, e.g., different pieces of a story or video scene (see Task 8 below). Allowing for multi-modal input further enhances the learning process (see Brandl, 2008).

Jigsaw tasks can be designed in a variety of ways. They lend themselves for dyadic interactions, but can also be structured so they involve multiple users interacting in small subgroups or larger groups (see Tasks 8, 9, 11 below). A multi-user jigsaw design in particular is structured so that multiple students are required to respond and share information on one piece of the jigsaw puzzle.

Other examples are decision-making tasks (see Tasks 5 and 6). Such tasks require learners to arrive at a particular outcome, which often only can be achieved by engaging in multiple negotiations and turns communicating between students. Research has shown that such tasks are even more effective than jigsaws in several ways. For example, studies by Smith (2003) and Keller-Lally (2006) have shown that decision-making tasks yielded more negotiated turns and language output than jigsaws.

The quantity of learner negotiations and language output seems to be further influenced by whether there is a single solution (closed outcome) or whether the solution allows for some flexibility (open outcome). For example, Smith (2003) has shown that tasks that allow for a range of possible solutions generated more negotiations and also more output among learners than jigsaw tasks with a narrow outcome. This claim is further corroborated by Keller-Lally (2006) who has shown that opinion exchange tasks, i.e., tasks in which students have more freedom in choice of language content and structure, yielded more language output than jigsaw tasks with a closed outcome. These findings suggest a jigsaw design that equally splits information among its participants initially triggers some form of interaction.

However, if the task outcome is closed or its solution can be too easily negotiated the interaction comes to a halt as soon as students have achieved the outcome. However, simply making the task more difficult does not necessarily eliminate this issue, as tasks, which are too difficult may result in the learner “giving up” before information has been exchanged and or using English to guess at possible solutions (Brandl, in press).

Consider the Effect of Task Types and Goals

One of the criteria that defines a task is it requires students to achieve an outcome. CMC-based tasks can be designed allowing students to be open-ended in their responses (e.g., open discussions or opinion-based tasks – see Task 2, 11 and 12), or requiring learners to achieve a particular outcome (e.g., jigsaw or decision-making tasks – see Task 1, 3-9). These designs affect learners’ language production in different ways. For example, Keller-Lally (2006) has shown that tasks requiring a closed or narrow outcome have the highest error rates, as opposed to those that allow for more freedom in language choice, such as decision and opinion tasks, which have the lowest.

Some task types also seem to be more prone to breakdown, non-target language use, and off-task behavior. Comparing the task effects of jigsaws (closed outcome) with decision-making (convergent) and opinion exchange (divergent) types, Keller-Lally (2006) found that the decision-making tasks yielded the highest results in terms of task completion, while jigsaw tasks came in lowest. Conversely, her data showed that jigsaws (closed tasks) yielded the least amount of non-target language use and decision-making tasks produced more off-task behavior among students than jigsaws and opinion exchange tasks. Her findings suggest that a number of factors are at play that affects learners’ behavior in various ways. It seems the less flexibility students have in arriving at an outcome, that is, when the

solution to a problem is very narrow, the higher the likelihood that task breakdown and off-task discussions will occur, which may further impact task completion. In addition, closed tasks often allow for less choice in language use and force a particular learner output. Such a strategy has advantages and disadvantages. The advantage is that this practice allows for a controlled focus on new materials and learners have fewer possibilities to avoid targeted language structures, all important considerations in initial input processes (Brandl, 2008). The disadvantage is that this strategy can have a limiting effect on learners’ language use, as they do not feel encouraged to experiment and play with language, which must be considered a contributing factor to learners’ language development. On the other hand, as demonstrated by research, the less structured and the more open-ended tasks are, the more likely it is that students will produce more errors in the target language (see Brandl, in press).

Consider the Relationship Between Task Behavior and Complexity of Input

The cognitive theory posits that the nature of task input, e.g., whether the modality of the input is textual or pictorial, or whether the input contains some or many details, is abstract or concrete impacts learner outcome (see Skehan, 1996). In CMC, the complexity of task input in its effect on learner behavior, by and large, remains unexplored. A few studies, nevertheless, allow us to extrapolate some conclusions on the effect of this variable on learner negotiations. For example, Blake (2000) compared the effects of two jigsaw tasks, one that made use of picture-based contents (calendar task) and a second that used text-based materials (see Task 4 “Apartment hunting”). In the calendar task, students had to describe pictures to each other and then put these pictures in order to come up with a complete story. In the text-based task, students had to choose an apartment from a list of ads and agree upon an apartment that met

both interactants' preferences. The results show that the students accomplished the calendar task by exchanging information in half the number of turns than it took others to complete the text-based apartment task. This finding can be explained by the fact that images may have been easily distinguished in content (e.g., a man is surfing with a woman on his arm; a man and a woman are dancing at night) which allowed for easy ranking. As a consequence, no additional clarifications and follow-ups may have been necessary. On the other hand, achieving an outcome in the text-based apartment task was much more complex and challenging. It involved processing and keeping in focus many subtle details, while having to come to an agreement on an apartment that met both interactants' prearranged preferences.

In a similar study, Pellettieri (2000) investigated students' negotiations of meaning when subjected to divergent decision-making tasks and different jigsaw tasks with closed or divergent outcomes. She found that closed tasks with convergent goals and only one possible outcome were conducive to a larger degree of negotiations. An analysis of the differences of pictorial content revealed that those tasks involving pictures with the subtlest details yielded the highest number of negotiations. The conclusions drawn from the further analyses of Blake and Pellettieri's instruments studies suggest that factors, such as the source of input and the task behavior contribute to task complexity, but they do so in different ways. For example, an abstract image or an image that depicts many details may be complex to describe. If multiple images are to be compared and sequenced, it may not be the complexity of the image, but the subtlety of differences that determines the complexity of the task.

Consider the Benefit for Task Structuring

Tasks need to be designed with particular goals in mind. On the one hand, they should stimulate

interaction, which push learners to use targeted linguistic resources for negotiation of meanings and also lead towards increased use of language. The more language learners produce the more likely language operations become automatized that support the development of fluency. On the other hand, tasks also need to allow for time to focus on form. As Lamy & Goodfellow (1999) have pointed out, a task that simply requires social conversation may not stretch learners' ability with language production. Or, in tasks that focus students' attention primarily on the functional demands and outcome of the pedagogical activity, attention to language form may be low (Johnson, 1996; Klein & Perdue, 1992; Loschky & Bley-Vroman, 1993; Schumann, 1987; Skehan, 1998). Based on such claims, mere interaction is not enough and task designs need to embed strategies that also allow for focus on form. At the same time, there should be a balance between fluency and accuracy and one should not come at the expense of the other (Skehan, 1998). How can such different goals be reconciled?

One way of achieving this goal is by structuring tasks deliberately so a particular linguistic content must be kept in focus. Using Ellis' (2003) definition of structured tasks, "the term structure here refers to whether the product the tasks elicits has to be 'creatively' structured by the learners or whether it exists in some kind of pre-structured form" (p. 123). It can also be argued that if learners can draw upon some kind of pre-structured form it takes less time for formulation of output than would otherwise be needed. With more time available, students will more likely pay attention to language form, which as a consequence may positively affect their accuracy. Pre-structured tasks may have another advantage by aiding the learners' in staying focused on the target structures (see Tasks 1–4).

Brandl (in press) compared the effects of a structured/required and an unstructured/optional task in synchronous and asynchronous environments on learners' quantity and quality of language

production (see Task 3). The unstructured/optional task allowed for an open-ended outcome, whereas the structured/required task was based on a narrow and controlled design. He found that students produced more language in unstructured than in structured tasks in the synchronous mode. While he found no difference in the asynchronous mode, he primarily attributed this effect to the task type. As far as the effects on accuracy are concerned, however, the structured task groups outperformed the open task groups under asynchronous conditions, while no significant effect was observed in the synchronous mode. Brandl's findings suggest if the focus is on accuracy, allowing for time and using pre-structured task content are two factors that make a difference in the learner's quality of language production and should be considered in task design.

Considering Synchronous or Asynchronous Task Designs

In CMC, synchronous has become synonymous with students interacting at the same time, while being at different places. Asynchronous means interaction takes place in different places and at different times. Some researchers have argued that synchronous CMC is closer to oral interaction than asynchronous CMC because copious communication strategies and a range of discourse patterns are found in the synchronous CMC environment (Sotillo, 2000). The questions that arise are: What are benefits for written interactions, and what is the impact of a synchronous or asynchronous mode of communication on language learning?

Several arguments can be made in favor of synchronous interactions. Some researchers have posited that synchronous CMC might transfer to face-to-face interaction and the development of oral skills. Students performing under time pressure aids in the development of fluency. For example, Payne and Whitney (2002) claim that real-time, online conversational exchange via text indirectly helps to develop L2 speaking ability. In

particular those learners with lower phonological working memory capacity may benefit most. It might also be argued that the task immediacy requirement of the synchronous mode impacts the quantity of information exchange. This claim was supported by Brandl (in press) who investigated the effects of a structured/required and unstructured/optional task on learners' language production under synchronous and asynchronous conditions. His results show that the unstructured task design led to more language output than the structured task. This effect was more pronounced and complimented under synchronous conditions.

Despite some of the positive evidence in favor of synchronous forms of interaction, some researchers have criticized its lack of quality of language use and have questioned its effect on the development of linguistic competence (see Beauvois, 1992; Chapelle, 2003; Chun, 2008; Kern, 1995). One factor that accounts for the lack of quality of language use has to do with task immediacy pressure or lack of time, which, as research has shown, affects learners' accuracy in negative ways. For example, comparing learners' quality of language production when working in asynchronous CMC and synchronous CMC environments, Sotillo (2000) has shown that when participants have sufficient time to comprehend, plan, and produce messages, in addition to having less pressure to reply to signals immediately, their utterances are generally more accurate, complex, formal and longer. The effects seem to be in particular evident when learners draw on their rule-based system (see Ellis, 1987; Hulstijn & Hulstijn, 1984). Learners who are most likely in need of doing so are beginning and intermediate language learners whose interlanguage systems are not yet sufficiently developed. They also require more time to process language.

Brandl's study (in press), which compared the effects of a structured/required and unstructured/optional task on learners' error rates under synchronous and asynchronous conditions, provides some support for this claim. His results show that

students produced fewer grammar errors under asynchronous than synchronous conditions. Although this difference was not significant, the effect size of the standard deviation units of the mean differences, i.e., the comparison between students performing a structured/required or an unstructured/optional task, was much higher under the asynchronous condition. As far as spelling errors were concerned, however, the asynchronous groups clearly outperformed the synchronous groups.

In sum, there is no doubt that the conditions under which students operate impact language production. The environment, however, as suggested by Brandl (in press), seems to be secondary and have more of a complementary effect. Task design factors, such as task structuring, the source of input, and task complexity seem to play a primary role in their impact on learners' language use in a quantitative and qualitative sense.

Understand the Nature of Dyadic or Multiple Student Interactions

While CMC-based tools (e.g., chat rooms, blogs, forums, or e-mail applications) allow for multi-user interactions, chats are commonly used only between two people. The question arises, what are benefits of dyadic in comparison to multi-user interactions? Which task design strategies lend themselves to dyadic conditions, which ones more for multi-user interactions?

In CMC the majority of research has focused on dyadic interactions, and only little is known about the effects of different sizes of student configurations on task types, outcomes and learner language behavior. Keller-Lally (2006) compared partner and small-group interactions with the goal "to determine the most effective task-group configurations for achieving task outcomes and promoting higher quality of student discourse" (Keller-Lally, 2006, p. 9). Her findings show that interacting in dyads or in small groups affects task behavior and language use in various ways. For

example, students working in dyads displayed a lesser amount of non-target language use than when working in small groups (3-4 students). She also observed more remediated negotiations in dyadic setups than in small groups. On the other hand, dyads digress more often than small groups. Small groups are also more likely to complete tasks than dyads.

Despite the potential benefits of arranging for different numbers of students interacting in tasks, implementational procedures and logistics often constitute a major hurdle. Scheduling issues or in particular lack of learner participation are frequent sources of frustrations for students and teachers alike. Furthermore, setups that allow for multiple-user interactions and special groupings depend on software capabilities and flexibility that are not standard in online course management systems at this time.

Consider the Benefits of Multi-User Interactive Designs (MUID)

In the classroom, multi-user interactive designs (MUID) constitute activities such as open discussions, mingling activities, jigsaws, or "posting activities". In online learning, a MUID approach is normally applied asynchronously, and in comparison to in-class environments, they have numerous advantages. Students can work at their own pace and time when responding to each other. It also allows for in-depth processing of each other's contributions. Because the communication takes place in writing, the written records can also later be used for follow-up and focus on form activities. Last, this flexibility offsets many of the logistical issues such as students having to arrange times to meet online, or students being stranded without a partner that teachers often experience when implementing synchronous tasks.

Tasks that follow a MUID approach can be designed in different ways. The most common strategy is the use of a forum, which lends itself well for open discussions, in particular at inter-

mediate and advanced levels. Most forums can be designed in different ways, allowing teachers and students to start discussion threads, while allowing for or limiting further peer responses (see Task 11: Immigration Problems in the USA).

Other examples are jigsaw designs. Such tasks can be configured in a variety of ways. For example, tasks with closed outcomes work best if multiple learners are assigned to work on the same goal, such as responding to the same piece of the puzzle (see Task 8: A Robbery). This strategy becomes imperative if peer dependability is to be offset. In this way, the likelihood is reduced that students are not able to perform the tasks because some students neglect to participate or a student's quality of contribution is insufficient for the group to achieve the outcome. At the same time, input from multiple students on the same assignment gives group members the opportunity to process a range of answers provided by their peers. Furthermore, multiple user responses allow peers to choose with whom they would like to follow-up with and further negotiate missing information and misunderstandings. Other jigsaw designs, e.g., those with divergent outcomes that do not make the outcome contingent upon one prescribed solution, allow for more flexibility in arranging task assignments among students (see Task 9: The Seven Families Game). Here the number of puzzle pieces may be distributed among an equal number of students.

There is one caveat regarding jigsaw designs that allow multiple students to deal with one piece of a puzzle that needs to be mentioned. That is some students may feed off their peers' responses without making any contributions in order to arrive at the desired outcome. This kind of behavior, however, can be controlled in several ways. First, a teacher evaluates each student's contribution to the task. Second, if the course management program allows for it, students should only be allowed to access each other's comments once they have posted their own answers. This design feature is known as conditional assignment and

has become a standard feature in some course management systems (see Moodle 2.0 for conditional assignments).

Follow up on Task Assignments

A teaching approach that emphasizes student interaction, whether this takes place in the classroom or through computer-mediated communication, ultimately warrants teacher intervention and follow-up to enhance its effectiveness. Brandl (2008) has argued that there are several reasons for the instructor to follow up on the learners' task assignments. Following up makes students accountable for what they have accomplished. If students know that their work will be assessed or that a product will be presented to others, it may impact their motivation and affect. As a result, more accurate language may be the outcome.

Following up on tasks also allows the instructor to provide feedback and further focus on accuracy. As there is a tendency of some students to pay less attention to form, in particular under synchronous conditions, when they feel pressured to get meaning across, the implementation of a subsequent post-task activity is imperative. Following up on the quality of language signals to the learners that it is not only important getting the job done, but also getting it done well (Skehan, 2003). This can be approached in different ways. For example, as Salaberry (2000) suggests, "the instructor may save the transcripts of the CMC session and subsequently distribute them at the end of the activity to the students in order to have them identify specifically targeted grammatical items, correct their own errors, correct errors in other learners' transcripts, summarize the discussion in the form of a written essay, and so forth" (p. 35).

Students can also be asked to report back on what they have learned from each other. According to Skehan (2003), the strategy of *reporting back* in particular has significance for acquisition. Reporting back gives learners the opportunity to rework the materials they have discovered. As argued by

Bygate (1996), reworking may also cause learners to attend more to form and “by doing so they may consolidate and extend their understanding of the target language” (Skehan 2003, p. 407).

Finally, following up on task outcomes provides further opportunity to use task outcomes and to integrate them with other tasks assignments, serving as a springboard into or reinforcing other desired skills.

CONCLUSION

The aim of this article was to provide a brief overview of theoretical perspectives and different design variables underlying research in CMC. In addition, different guidelines that can aid in understanding task effects and designing tasks in CMC environments were presented. In the appendix, 11 prototypes of different task configurations are provided. For each task, an overview of the design variables¹, a rationale that justifies its design, and a detailed procedural description are included.

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KEY TERMS AND DEFINITIONS

Asynchronous: An interaction takes place in different places and at different times.

Closed Task: An information exchange task with a pre-determined outcome.

Convergent Task: An opinion exchange task with a closed outcome.

Decision-Making Task: A task that requires one or more participants to agree to a solution of a problem.

Divergent Task: An opinion exchange task with an open outcome.

Information-Gap Task: A task that involves the exchange of information between two or multiple participants. The information is normally pre-determined.

Jigsaw Task: A two-way information exchange task where the information is split between two or more participants and is required to be exchanged.

MUID (Multi-User Interactive Design): A strategy in task design that requires at least three participants to share information with each other.

One-Way Task: An information gap task where one student holds the information, while the other holds none.

Open Task: An information exchange task with multiple different outcomes as determined by the participants.

Opinion-Gap Task: A task that involves the exchange of information between two or multiple participants. The information is normally based on the participants' own views.

Structured Task: In a structured task the product the tasks elicits exists in some kind of pre-structured form.

Synchronous: An interaction takes place at the same time, while being at different places.

Two-Way Task: An information gap task where the information to be exchanged is split between two or more participants.

Unstructured Task: In an unstructured task the product the tasks elicits has to be 'creatively' structured by the learners.

ENDNOTE

- ¹ What makes a task linguistically difficult may vary among languages. The performance of some linguistic skills may qualify a task to be at the low intermediate level, while in another language the same skill may be considered more advanced.

APPENDIX: TASK EXAMPLES

Task 1: A Ghost Story

Design Variables (Table 1)

Goal

1. Finding the correct sequence
2. Writing a story

Rationale

The goal of this task is find out the correct picture sequence. To do so, students need to describe the content of each picture first. The pictorial content of the cartoons is complex in detail and hence requires intermediate-level language skills. The strength of this design are the drawings. Each depiction in scene 1-6 distinguishes itself from others in subtle ways. At first, students may overlook the differences, which consequently may lead to additional follow-ups and stimulate interactions. Describing the pictures involves the use of prepositions and comparatives. The story also lends itself well for a write-up and creative discussion about its meaning, which makes the outcome of this part open-ended.

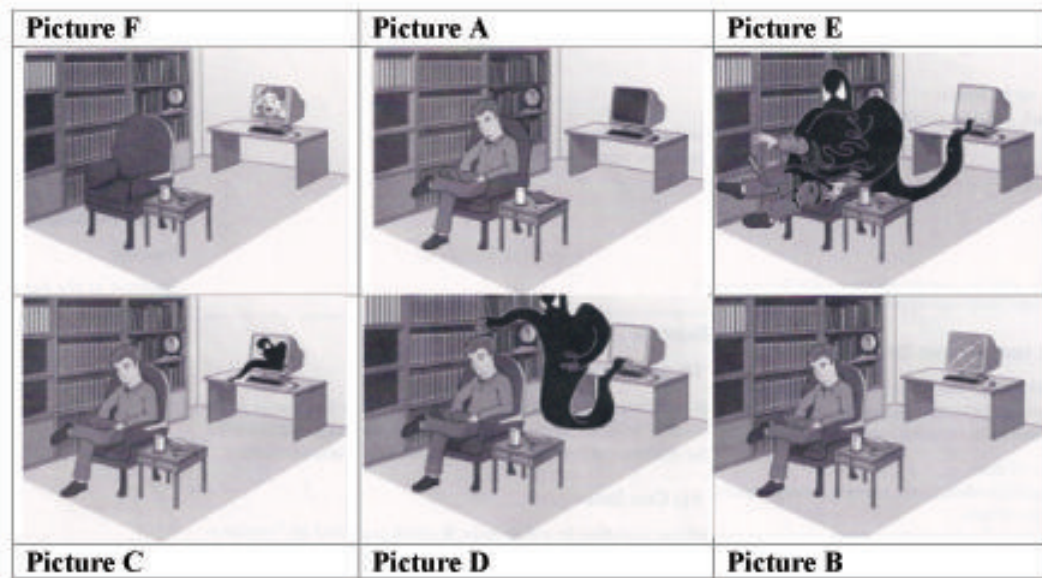
Description and Procedure

Students work in dyads synchronously in a chat room. A student receives either pictures F, E or B or pictures A, C, and D (Figure 1). First, the students are to describe the pictures to each other and figure out the correct sequence. Second, they write up a story that the pictures suggest and submit this story to their instructor. (Note: vocabulary relevant to describing the story, e.g., to devour, ghost, alarm scream, etc. should be included in the task description.)

Table 1.

Type/information flow jigsaw task/two-way	Outcome Part 1. closed Part 2. open	Contextual support/complexity visual cues/ medium
Mode synchronous	Groups dyads	Level intermediate
Communicative demand high	Required interaction medium	Discourse functions/skills prepositions, comparatives

Figure 1. A ghost story. From Communicative language teaching in action (pp. 310-311). By K. Brandl, 2008, Upper Saddle River: Pearson Prentice Hall. Copyright 2008 by Pearson Prentice Hall. Used with permission.



Task 2: A Family Tree

Design Variables (Table 2)

Goal

1. Filling in the chart of the family tree

Rationale

The goal of this beginner’s level task is for students to practice the use of kinship terms, asking questions and giving answers. Working in dyads, students have to elicit information that is missing on their family tree from their conversation partners. While some information that the learners have to exchange is

Table 2.

Type/information flow jigsaw task/two-way	Outcome closed	Contextual support/complexity textual clues (structured content)/ medium
Mode asynchronous	Groups dyads	Level beginners
Communicative demand low	Required interaction low	Discourse functions/skills kinship terms; questions and statements

integrated in the chart of the family tree, some facts about the members of the family tree is stated in the form of verbal descriptions or clues. For example, one conversation partner would be given information such as “Petra ist 40 Jahre alt und ihr Mann ist vier Jahre älter“ [Petra is 40 years old and her husband is four years older], while her chat partner has information about the name of Petra’s husband, e.g., “Petra ist mit Rainer verheiratet [Peter is married to Rainer].” To arrive at the task outcome, students first have to decipher the information in the verbal descriptions. By doing so, they indirectly process models of language structures, which also serve as models when interacting with their chat partners.

Description and Procedure

Students work in pairs, each receiving either Partner A or Partner B. Students post their questions and answers to the forum to complete this assignment.

Filling in a Family Tree: Partner A

You and your partner have different information about this family. First, read through the information provided below and fill in as much information as possible. Then, ask your partner questions to find out the remaining missing information (Figure 2).

- Der Großvater heißt Georg. [Grandfather’s name is George.]
- Lisa hat vier Enkel und ist pensioniert. [Lisa has four grandchildren and is retired.]
- Maria ist die Schwester von Klaus und Felix. [Maria is Klaus and Felix’ sister.]
- Julia ist so alt wie ihr Kousin Felix. [Julia is the same age as Felix’s cousin.]
- Carmens Nichte ist 10 Jahre alt. [Carmen’s niece is 10 years old.]
- Klaus’ Vater heißt Daniel und er lebt in Würzburg. [Klaus’s father’s name is Daniel and he lives in Würzburg.]
- Petra ist 40 Jahre alt und ihr Ehemann ist vier Jahre älter. [Petra is 40 years old and her husband is four years older.]
- Georg hat zwei Töchter. [Georg has two daughters.]
- Carmen ist Sekretärin. Sie lebt mit ihrem Mann und Kindern in Würzburg. [Carmen is a secretary. She lives with her husband and children in Würzburg.]

Filling in a Family Tree: Partner B

You and your partner have different information about this family. First, read through the information provided below and fill in as much information as possible. Then, ask your partner questions to find out the remaining missing information (Figure 3).

- Petras Mutter ist 65 Jahre alt. Sie und ihr Mann leben in Frankfurt. [Petra’s mother is 65 years old. She and her husband live in Frankfurt.]
- Julia, Lisas Enkelin, hat keine Geschwister. [Julia, Lisa’s grandchild, has no brothers and sisters.]
- Daniels Schwiegervater ist 71 Jahre alt und er arbeitet nicht mehr. [Daniel’s father-in-law is 71 years old and does not work any more.]

Figure 2. Family tree chart A

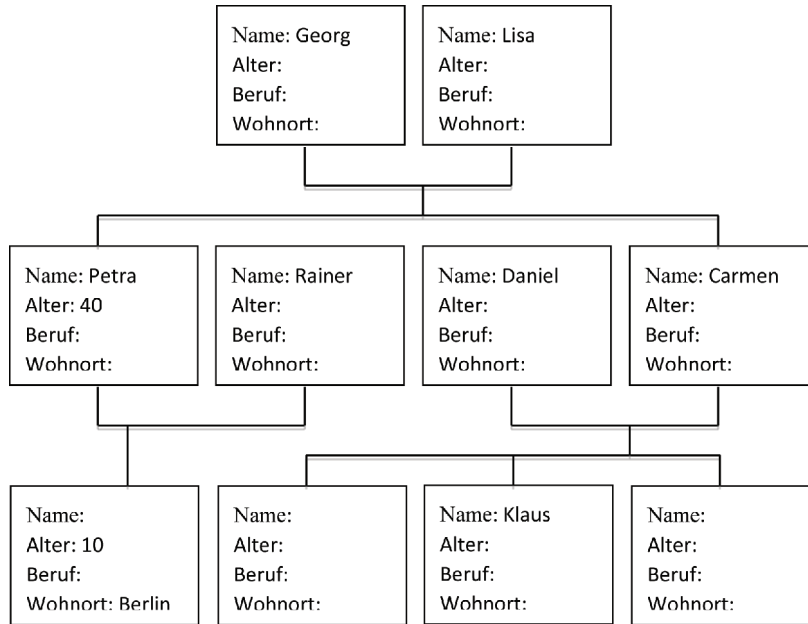
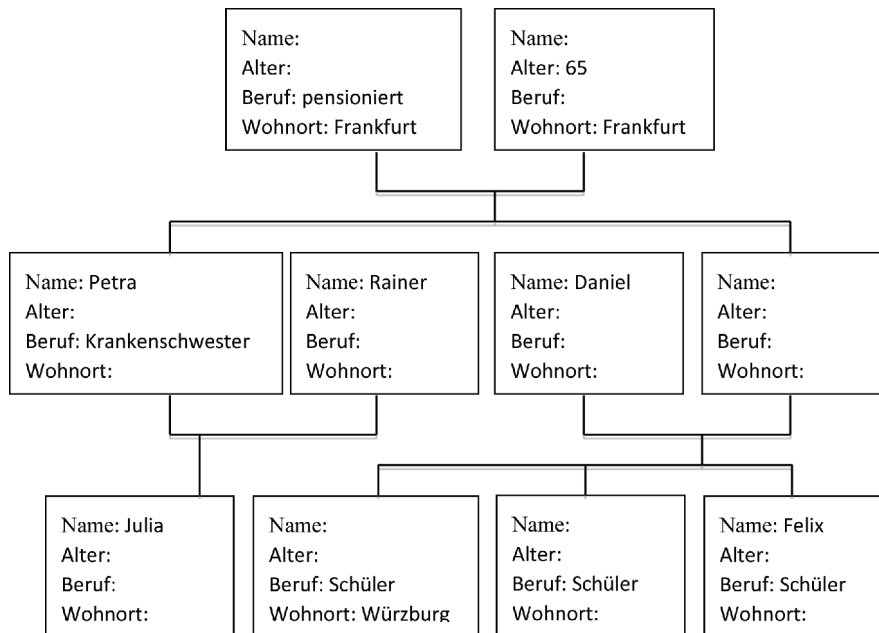


Figure 3. Family tree chart B



- Felix geht mit seinen Geschwistern in Würzburg zur Schule. [Felix goes to school with his brothers and sisters in Würzburg.]
- Julia ist vier Jahre älter als Maria. [Julia is four years older than Maria.]
- Petra ist mit Rainer verheiratet. [Petra is married to Rainer.]
- Felix ist zwei Jahre älter als Klaus. [Felix is two years older than Kaus.]
- Julias Eltern leben in Berlin. Sie ist Krankenschwester und er ist Zahnarzt. [Julias's parents live in Berlin. She is a nurse and he is a dentist.]
- Daniel ist ein Jahr jünger als Petra und ein Jahr älter als seine Frau. [Daniel is one year younger than Petra and one year older than his wife.]
- Julias Onkel ist Photograph. [Julia's uncle is a photographer.]

Task 3: Finding Differences

Design Variables (Table 3)

Goal

1. Finding ten differences
2. Describing your partner's classroom

Rationale

This task is ideal for two students communicating in a chat room. The goal of finding ten differences requires students to describe their pictures to each other and furthermore engages them in additional follow-up questions. The required level of interaction will be high, if students want to find all the differences. While there is a closed outcome to this task, it is not necessary to find all ten differences to accomplish this task. Engaging in this task allows for partial completion, which has the benefit that students may not get frustrated and give up without achieving any outcome. The disadvantage is that not all students may strive towards finding all ten differences. The content of the images are closely structured, which prevents students from getting sidetracked. The task design requires students to keep meaning in focus and the narrowly controlled focus on content reduces the linguistic challenges and supports students' focus on form.

Table 3.

Type/information flow jigsaw task/two-way	Outcome 1. closed (convergent); solution: multiple parts 2. open	Contextual support/complexity visual cues (structured)/low
Mode synchronous	Groups dyads	Level beginners
Communicative demand medium	Required interaction high	Discourse functions/skills describing locations/classroom objects, numbers, plurals, questions, prepositions

Description

Students work in pairs in a chat room, while each student is given a different picture. Students submit a description of their partner's classroom to their instructor (Figure 4).

Task 4: Apartment Hunting (adapted from: R. Blake, 2000, p. 139-141)

Design Variables (Table 4)

Goal

1. Choose an apartment from a list of ads and agree upon an apartment
2. Writing up the results

Rationale

The goal of this task requires two students to choose an apartment from a list of ads and come to an agreement that meets both interactants' preferences. This task is ideal for two students communicating in a chat room. The required level of interaction will be high as each student has a set of different priorities, preferences and limitations that they have to negotiate. Being able to sort out all the differences and subtle details of the textual cues makes this task cognitively challenging and also asks for intermediate-level language skills. As this task has only one solution, some students may get frustrated in finding the correct answer. The cognitive and linguistic challenges involved in performing this task synchronously may also significantly impact the learners' quality of language production, which warrants a follow-up on learners' error in their summary report.

Description

Student A and B are going to live together in an apartment in Madrid, Spain. You must decide on an apartment, which is mutually to each other's liking, but each of you has a different set of priorities,

Figure 4. Finding difference. Note. From Epar Bangla Opar Bangla. An elementary language course for Bangla, by C. Salomon, N. Abedin and K. Brandl, 2010, University of Washington, Seattle. Copyright 2010 by University of Washington. Reprinted with permission.

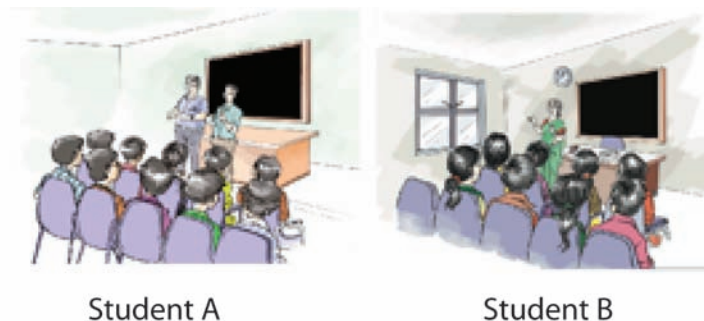


Table 4.

Type/information flow	Outcome	Contextual support/complexity
jigsaw task/two-way	closed/single solution	textual cues (many details)
		linguistic: medium
		cognitive: high
Mode	Groups	Level
synchronous	dyads	intermediate
Communicative demand	Required interaction	Discourse functions/skills
medium	high	describing living arrangements; expressing preferences; vocabulary related to living/ apartments/ houses/ ads

preferences, and limitations (money, car/no car, smoking/non-smoking, etc.). A & B must negotiate their final choice of apartments. Then A & B write up results and turn it in to the instructor.

Partner A (for Student A Only)

You and your partner are going to spend next year in Madrid studying through the Education Abroad Program (EAP). This program requires that before you go, you secure a place to live in Madrid. They have just sent you and your partner lists of possible apartments from which you might choose. You have four listings and your partner has four different listings. Since you will be living with your partner next year, the two of you need to share your ads and decide in which place you would like to live. You will make the decision based on your own personality preferences, with the following caveats:

- Since you feel the cold in the winter, you are fairly insistent that there be central heating.
- You are on a strict budget, so you need an apartment that costs less than 100.000 pesetas per month.
- You are a picky about your place being clean, so you'd like your place to have a dishwasher.
- Your partner, of course, has his or her own preferences that you have to accommodate.

Chat with your partner and discuss the options you have. Your goal is to find a place from your combined listings with which you can both be happy. This may require that you give in on one of your preferences. You may do this, but you should not give in on more than one of your preferences. The ads are written in abbreviated jargon; you will have to help each other understand the content of each one.

Listings (Table 5)

Partner B (for Student B Only)

You and your partner are going to spend next year in Madrid studying through the Education Abroad Program (EAP). This program requires that before you go, you secure a place to live in Madrid. They have just sent you and your partner lists of possible apartments from which you might choose. You have four listings and your partner has four different listings. Since you will be living with your partner next

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Table 5.

Tipo A	Tipo B
ANTON Martín. Comparto piso con 1/2 chicos-as 100 m2, ext, luminoso, 3 dorm, amueblado, wc, aseo, c/i, estar, 3 balcones, bien comunicado. 40.000 pts. por persona. [ANTON Martin. Share flat with 1 / 2 guys - as 100 m2., ext, bright, 3 bedrooms, furnished, toilet, shower, w/h, 3 balconies, well connected. 40.000 pts. per person.]	
2. ARGUELLES, c/ Conde Duque, junto Metro San Bernardo. Comparto piso 2 hab, amueblado, calefacción, wc individual, derecho a cocina, teléfono, electrodomésticos, televisión, soleado, bien comunicado. 31.000 pts. [ARGUELLES, c / Conde Duque, with Metro San Bernardo. 2 rooms share flat, furnished, heating, individual toilet, shared kitchen, telephone, electrical appliances, television, sunny, well-connected. 31,000 pts.]	
3. MORATALAZ, busco chica-as para compartir piso, totalmente amueblado, calefacción, tel, TV, tranquilo, soleado, buena comunicación bus y metro Artilleros. Dos chicas, 25.000 ptas c/u. Una chica, 35.000 ptas comunidad incl. [Moratalaz, looking for girl(s) to share a flat, fully furnished, heating, telephone, TV, quiet, sunny, good connection to bus and subway Artilleros. Two girls, 25,000 pts w/u. A girl, 35,000 pesetas, including condo association fees.]	
4. PLAZA de España, zona. Disponibles 1 hab indiv (42.500 ptas gastos incl) y otra doble con wc (27.000 ptas persona), en mismo piso, compartido estudiantes: cocina, 2 wc, electrodomésticos, calefacción, etc. [Plaza of Spain, area. Available 1 single room (42,500 pts incl costs) and a double with toilet (27,000 ptas person), on the same floor, students share a kitchen, 2 toilets, appliances, heating, etc.]	4

year, the two of you need to share your ads and decide in which place you would like to live. You will make the decision based on your own personality preferences, with the following caveats:

- You are fairly insistent that the apartment you rent be furnished.
- You really want the place to have a balcony or a terrace so you can take in the ambiance of Madrid right from your apartment.
- You like to cook so the place must have a kitchen.

Your partner, of course, has his or her own preferences with which the two of you must work. Chat with your partner and discuss the options you have. Your goal is to find a place from your combined listings with which you can both be happy. This may require that you give in on one of your preferences. You may do this, but you should not give in on more than one of your preferences. The ads are written in abbreviated jargon; you will have to help each other understand the content of each one.

Listings (Table 6)

Task 5: Shopping for a Gift (adapted from: Smith, 2006, p. 57)

Design Variables (Table 7)

Goal

Making a decision on gifts for a home stay family

Table 6.

Tipo A	Tipo B
	1. ARTURO Soria. 210 m2, piso vacío, ext, 3 dorm, amueblado, 2 WC, cocina con terraza tendadero cerrada, garaje, vigilancia 24h, gran jardín y piscina cerrado, paddle, squash, gimnasio, sauna, solvencia, nómina o aval, 155.000 pts. incl comunidad. [Arturo Soria. 210 m2, floor vacuum, ext, 3 bedrooms, furnished, 2 toilets, kitchen with utility room enclosed terrace, garage, 24 hour security, large enclosed garden and swimming pool, paddle, squash, gym, sauna, credit, payroll or guarantee, 155,000 pts. including condo association fees.]
	2. ALCOBENDAS, Arroyo de la Vega, junto a La Moraleja, Piso a estrenar, 3 dorm, comedor, 2 wc, cocina tendadero, electrodomésticos, piscina comunitaria, 85.000 pts. [ALCOBENDAS, Arroyo de la Vega, along with La Moraleja, New apartment, 3 bedrooms, dining room, 2 WC, kitchen, utility room, electrical appliances, communal pool, 85,000 pts.]
	3. ALBERTO Aguilera. Ext, 3a planta, vacío, recibidor, 5 dorm, salón-comedor, cocina, terraza, wc completo, aseo, c/c, ascensor, Buen edif. 100.000 pts. [Alberto Aguilera. Ext, 3rd floor, empty, hall, 5 bedrooms, living room, kitchen, terrace, toilet, c/c, lift, good bldg. 100,000 pts.]
	4. CUATRO Caminos, C/ San Raimundo. Hab indiv ext, para chico, en piso compartido, luminoso, soleado, terraza 200 m2, lavadora, calef. 30.000 pts. [CUATRO Caminos, C / San Raimundo. Add ind. room for child in shared flat, bright, sunny, terrace 200 m2, washing machine, heating. 30,000 pts.]

Rationale

In this task, two students have to decide on four gifts for their home stay family. Smith (2003) used this task design in a study in which he found that decision-making tasks yielded more negotiation sequences than jigsaw tasks. This shows that this task is an excellent example of a task that creates copious interactions. Since both interactants have to come to an agreement, the communicative demand creates some performance pressure. Performing involves providing reasons and some convincing, which requires linguistic skills at the intermediate-level. The cognitive demands for this task are low.

Description and Procedure

You and your roommate/friend are trying to decide on some gifts for your home stay family here in the United States. Your host family has four (4) members; Mr. Jones (father), Mrs. Jones (mother), Billy Jones (son 15 years old), and Mary Jones (daughter 14 years old). Below are some items you have noticed while shopping at the Mall, which may make good presents. Your roommate/friend has been shopping at the Mall and has also seen some (different) things that he/she thinks might make good presents.

Table 7.

Type/information flow jigsaw task/two-way decision-making	Outcome closed/convergent decision	Contextual support/complexity no contextual support/ linguistic: medium cognitive: low
Mode synchronous	Groups dyads	Level intermediate
Communicative demand medium	Required interaction high	Discourse functions/skills providing reasons; convincing

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Since the presents will be from both of you, you must decide together on **one present** for **each** family member (four total).

Student A Shopping for a Gift

List of gifts: razor, corkboard, wreath, and corkscrew

Student B Shopping for a Gift

List of gifts: bouquet, extension cord, magnifying glass, and comb

Task 6: Vietnamese Puzzle Story

Design Variables (Table 8)

Goal

1. Exchanging missing information, sequencing the text and finding the original order
2. Solving the problem: Who kissed whom and who slapped whom?

Rationale

In the classroom, this jigsaw task allows for a variety of group configurations, pairs or groups of five students. In an online environment, doing this task synchronously and in dyads may be the best approach. Providing the cues in English will require students to adapt the information in their target language and will prevent students from copying and pasting the text to each other without processing its meaning. Solving the puzzle requires decision-making and thus most likely will require numerous turns involving both interactants. Brandl (2010a) who conducted a comprehensive review of CMC task effects claims that decision-making tasks are the most promising in terms of how they affect learners' quantitative and qualitative language use. The cognitive complexity of this puzzle has a stimulating effect on learners' interaction, and yet it should not be overwhelming. The linguistic skills involved make this an intermediate-level task.

Table 8.

Type/information flow jigsaw task/two-way decision-making/problem-solving	Outcome Part 1. closed (single solution) Part 2. divergent (multiple solutions)	Contextual support/complexity textual cues/ linguistic: medium cognitive: high 1. sequencing: 2. problem solving
Mode synchronous	Groups dyads	Level intermediate
Communicative demand medium	Required interaction high	Discourse functions/skills arguing, establishing cause and effect/ past tense

Description and Procedure

Students work in dyads in a chat room. Each student is given five different lines of the text, e.g., student A gets line 1,3, 5, 7, and 9 in scrambled sequence, and student B receives the remainders. In a foreign language class, the cues should be provided in the students' L1.

1. There were four people sitting in a train in Vietnam in the late sixties. The four people were as follows: a young Vietnamese who loved this country, an old Vietnamese grandmother, a beautiful young girl of about eighteen, and an ugly American soldier.
2. Suddenly the train went into a tunnel.
3. There was the sound of a kiss.
4. All four people heard a slap.
5. When the train came out of the tunnel, the Vietnamese could see that the G.I's face was red.
6. The beautiful young girl glanced at the granny and the soldier in astonishment.
7. The granny was asleep in the corner of the compartment.
8. The young patriot grinned happily.
9. The problem is: who kissed whom and who slapped whom?

(Adapted from: M. Melville, L. Langenheim, M. Rinvoluceri, M. and L. Spaventa, 1980. *Towards the creative teaching of English*. London: George Allen and Unwin, p. 85.)

Task 7: A Hard Time Waking up

Design Variables (Table 9)

Goal

1. Finding the correct sequence
2. Writing a story

Rationale

The goal of this task is find out the correct picture sequence, which makes the design similar to task 1 "A ghost story". The pictures from the story "A hard time waking up" (see Figure 5) depict actions com-

Table 9.

Type/information flow jigsaw task/structured	Outcome Part 1. closed Part 2. open-ended	Contextual support/complexity visual cues/ linguistic/cognitive: low
Mode synchronous	Groups dyads	Level beginners
Communicative demand medium	Required interaction high	Discourse functions/skills describing morning routines; vocabulary related to morning routines

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monly found in beginning language classes. Scenes 2-6 distinguish themselves in subtle ways. Initially, students may overlook the differences, which consequently may lead to additional follow-ups and may stimulate interactions. Yet the pictures are not too complex, and students should be able to find out the correct solution without getting frustrated or having to give up. The story is also funny and students may feel inspired to be creative in their write-ups. The story lends itself best for a two-way interaction in a synchronous environment.

Description and Procedure

Students work in dyads synchronously in a chat room. A student receives either pictures 1, 3, 5 and 7 or pictures 2, 4, 6, and 8 (Figure 5). (Note: the pictures should be numbered randomly from 1-8). First, the students are to describe the pictures to each other and figure out the correct sequence. Second, they write up a story that the pictures suggest and submit this story to their instructor. (Note: vocabulary relevant to describing the story, e.g., to tickle, to shine, alarm clock, etc. should be included in the task description).

Figure 5. A hard time waking up. Note. From "Focus on form through collaborative dialogue: Exploring task effects," by M. Swain, and S. Lapkin. In Bygate, M., Skehan, P., & Swain, M. (Eds.) Researching Pedagogic Tasks (p. 99-118), 2001, Essex: Pearson Prentice Hall. Copyright Pearson Education Limited. Used with permission.



Task 8: A Robbery

Design Variables (Table 10)

Goal

1. Summarizing information based on eyewitness reports and sharing it with peers
2. Writing a summary report

Rationale

Although this task design makes use of a jigsaw, the informational exchange that takes place among students is primarily one-way. Students gather information from their eyewitness reports, post the information, and go back and retrieve the information from their peers. Misunderstandings and confusions about eyewitness reports may trigger some follow-up interactions. The design works well for an asynchronous set up, as it allows students to listen to the report and write a summary at their own pace. Assigning multiple students to one group guarantees multiple postings of one eyewitness report. This reinforces multiple readings and allows students to retrieve information from multiple postings. The retrieval of aural input adds a slight degree of complexity. The outcome suggests one solution but allows for flexibility and individually different reports.

Description and Procedure

Students are divided into groups of three and are assigned the following tasks: (Note: Students from each group listen to the same eyewitness report online and should only be given access to this one report.)

1. Listen to your eyewitness report.
2. Post your information to the forum so that your peers can read about it. Start your report with: “This is the eyewitness report number 1. He maintains ...”
3. Read through your peers’ reports/descriptions in the forum and write a final report. Your report should be as thorough as possible and contain answers to the questions below. If necessary, follow-up with questions to your peers about their eyewitness reports.

Table 10.

Type/information flow jigsaw task/structured	Outcome open-ended (convergent)	Contextual support/complexity aural cues/ linguistic: medium
Mode asynchronous	Groups minimum of three students/group	Level intermediate
Communicative demand low	Required interaction low to medium	Discourse functions/skills reporting, describing events; indirect discourse

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4. Submit this final report to your teacher.

Questions

1. How did the robbers break in?
2. Where was the witness when this happened?
3. At what time did the break-in happen?
4. How many people did the witness see?
5. How long were the robbers in the store?
6. What did the robbers look like?
7. What did they take?

[oral recordings of eyewitness reports]

1. Eyewitness Report

I was just setting up my shoe repair shop. I did not know what time it was. My watch is broken. I saw a pick up truck driving down the street. It suddenly stopped. The truck was red. Two people jumped out of the truck and ran towards the store. I don't know what they looked like. It was too dark, and I was too far away. They had something in their hands. They broke the windows. When they came out, they carried boxes in their arms. A few boxes fell down.

2. Eyewitness Report

It was 4 o'clock in the morning. I got up when I heard a noise. I live up here. When I looked outside the window, I saw two people sitting in the car. One was wearing a hat. The other had a white beard. He looked very old. The driver was young. It was dark and difficult to see how old he was. All of a sudden a man and a woman came running out the store. They carried boxes. The man carried a big one, the woman several smaller ones. She also dropped one or two. I don't remember what these two looked like.

3. Eyewitness Report

I sleep here on the street every night. I saw a car. There were four people in it. I don't know what time it was. I have no watch. I saw a man and a woman running into the store. They came back only after a few minutes. Everything happened very fast. One was carrying a computer. I could see a picture on the box showing a computer. He was tall, wore glasses, and had black beard. The other person looked like a woman, because she wore a dress. But her face looked strange. She had a mustache.

Task 9: The Seven Families Game

Design Variables (Table 11)

Goal

1. Finding other members of one's family
2. Identifying seven families including their members (alternative)

Table 11.

Type/information flow jigsaw task/structured	Outcome closed; solutions (multiple parts)	Contextual support/complexity textual cues/ linguistic: low
Mode asynchronous	Groups multiple	Level beginner
Communicative demand low	Required interaction low	Discourse functions/skills describing family configurations

Rationale

The goal of this activity is to find out one’s family members. This task is similar to an in-class activity during which students post their information around the classroom. First, students describe who they are and then post the information into the forum. As this activity involves a large group of students, it is best done asynchronously. The strength of this design is its narrow focus on form. At the same time, due to subtle differences in the family configurations, students are required to read through multiple postings. Although the outcome is closed, the solution contains multiple parts. Missing individual components will not result in the breakdown of the task. This particular activity has been designed for beginning language learners. Its cognitive, linguistic and communicative demand is low. An alternative design is asking students to identify all families including their members. The latter raises the task complexity.

Description and Procedure

Hand out a card to each student in class. Based on the cues, students describe who they are and post their description into the forum. This game can be played with a smaller number of students, in which case the number of families needs to be reduced (Table 12).

There are seven families described on the cards:

1. Klaus, Maria, Peter and Sascha (Berlin)
2. Klaus, Maria, Peter and Sascha (Hamburg)
3. Stefan and Maria (aged 23)
4. Stefan and Maria (aged 25)
5. Stefan, Anne, Thomas, Paula and Robert (Hamburg)
6. Stefan, Anne, Thomas, Paula and Robert (Berlin)
7. Klaus, Anne and Peter

Task 10: How you Live?

Design Variables (Table 13)

Goal

1. Interviewing a classmate

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Table 12.

Klaus	Maria	Thomas
You are 29 years old.	You are 23 years old.	Your mother's name is Anne.
Your wife's name is Maria.	Your husband's name is Klaus.	You live in Hamburg.
She is 23 years old.	He is 29 years old.	You have a sister called Paula and a brother called Robert.
You have two children, Peter and Sascha.	You have two children, Peter and Sascha.	
You live in Berlin.	You live in Berlin.	
Peter	Sascha	Robert
Your father's name is Klaus.	Your father's name is Klaus.	Your mother's name is Anne.
You have one sister called Sascha.	You have one brother called Peter.	You live in Berlin.
You live in Berlin.	You live in Berlin.	You have a sister called Paula and a brother called Thomas.
Klaus	Maria	Anne
You are 29 years old.	You are 23 years old.	You are 27 years old.
Your wife's name is Maria.	Your husband's name is Klaus.	Your husband's name is Stefan.
She is 23 years old.	He is 29 years old.	He is 26 years old.
You have two children, Peter and Sascha.	You have two children, Peter and Sascha.	You have three children, Thomas, Paula, and Robert.
You live in Hamburg.	You live in Hamburg.	You live in Berlin.
Peter	Sascha	Paula
Your father's name is Klaus.	Your father's name is Klaus.	Your mother's name is Anne.
You have one sister called Sascha.	You have one brother called Peter.	You live in Berlin.
You live in Hamburg.	You live in Hamburg.	You have two brothers called Thomas and Robert.
Stefan	Maria	Klaus
You are 26 years old.	You are 23 years old.	You are 29 years old.
Your wife's name is Maria.	Your husband's name is Stefan.	Your wife's name is Anne.
She is 23 years old.	He is 26 years old.	She is 27 years old.
You have no children.	You have no children.	You have one child called Peter.
You live in Hamburg.	You live in Hamburg.	You live in Hamburg.
Stefan	Maria	Peter
You are 26 years old.	You are 25 years old.	Your parents' names are Klaus and Anne.
Your wife's name is Maria.	Your husband's name is Stefan.	You have no brothers or sisters.
She is 25 years old.	He is 26 years old.	You live in Hamburg.
You have no children.	You have no children.	
You live in Hamburg.	You live in Hamburg.	
Stefan	Anne	Robert
You are 26 years old.	You are 27 years old.	Your mother's name is Anne.
Your wife's name is Anne.	Your husband's name is Stefan.	You live in Hamburg.
She is 27 years old.	He is 26 years old.	You have a sister called Paula and a brother called Robert.
You have three children, Thomas, Paula, and Robert.	You have three children, Thomas, Paula, and Robert.	
You live in Hamburg.	You live in Hamburg.	

continues on following page

Table 12. Continued

Stefan	Thomas	Anne
You are 26 years old.	Your mother's name is Anne.	You are 27 years old.
Your wife's name is Anne.	You live in Hamburg.	Your husband's name is Klaus.
She is 27 years old.	You have a sister called Paula and a brother called Robert.	You have one child, called Peter.
You have three children, Thomas, Paula, and Robert.		You live in Hamburg.
You live in Berlin.		
Paula		
Your mother's name is Anne.		
You live in Hamburg.		
You have two brothers called Thomas and Robert.		

2. Writing a report

Rationale

The goal of this task is to exchange personal information by asking a variety of questions. An interview following a Q and A format is probably the most common type of a communicative activity found in communicative-oriented textbooks. This type of interview format lends itself well for online synchronous chat assignments. One of the challenges of such interview tasks, however, is that students often limit themselves to minimum information in their responses. To offset such learner behavior, this task design asks students to follow-up on each other's answers with at least one additional question to each participant's response. In addition, requiring a written report holds students responsible for their outcome. Asking students to turn in their chat report increases their attention to form. The questions make the contents guided. The cognitive complexity of this task is low as students provide personal information. The task immediacy requirement puts the communicative demand at a medium level.

Description and Procedure

Ask your partner the following questions below. Ask at least one follow-up question in response to each of your partner's answers. When finished summarize what you have learned and submit your report (including the chat discussion) to your instructor.

Table 13.

Type/information flow two-way (one-way taking turns)	Outcome open-ended (personal information)	Contextual support/complexity structured (guiding questions)/ linguistic/cognitive: low
Mode synchronous	Groups dyads	Level low intermediate
Communicative demand medium	Required interaction low	Discourse functions/skills questions, vocabulary related to living, descriptions, some prepositions

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Wie wohnt Ihre Chat-Partnerin/Ihr Chat-Partner?

Fragen Sie Ihre Chat-Partnerin oder Ihren Chat-Partner und finden sie heraus:

Wo wohnt Ihre Chat-Partnerin/ Ihr Chat-Partner (in einer Wohnung, in einem Studentenwohnheim, in einem Haus, auf dem Land, in der Stadt, usw.).

Wohnt Ihre Chat-Partnerin oder Ihr Chat-Partner allein oder hat sie/er Mitbewohner? Oder wohnt sie/er bei ihren/seinen Eltern?

Wie lange braucht sie/er zur Uni? Wie kommt sie/er zur Uni? (mit dem Bus, zu Fuß, mit dem Fahrrad, usw.)

Was kostet ihr/sein Zimmer/ihre/seine Wohnung pro Monat?

Was für Möbel hat sie/er in ihren/seinen Zimmern/in ihrer/seiner Wohnung?

[How does your chat partner live?

Ask your chat partner and find out:

Where does your chat partner live (in an apartment, dorm, house, countryside, city, etc.?)

Does your chat partner live alone or with somebody else? Or does she/he live with her/his parents?

How long does it take her/him to go to the university? How does she/he get there? (by bus, etc.)

How much does her/his room/apartment cost per month?

What kind of furniture does she/he have?]

Task 11: How to Solve Immigration Problems in the USA

Design Variables (Table 14)

Goal

1. Writing a short statement about immigration problems
2. Finding the most compelling arguments for or against the issues

Rationale

The goal of this task is to use an online platform as a place for students to post information that can be accessed and utilized by all class members in preparation for a final debate. The benefit for this design is that it requires all classmates to make a contribution. The complexity of the task is high as expressing abstract thoughts and debating involve an advanced level of discourse and linguistic skills. The com-

Table 14.

Type/information flow one-way	Outcome open-ended (personal information)	Contextual support/complexity none/ linguistic: high
Mode asynchronous	Groups multiple	Level advanced
Communicative demand low	Required interaction low	Discourse functions/skills expressing abstract thoughts, providing arguments for and against; making hypothetical suggestions

municative demand is fairly low, although some students may feel apprehensive about posting their own message for all class members to read.

Description and Procedure

The discussion consists of two parts.

Part 1

The instructor posts the following questions to the forum. During the first round of discussion, students are required to respond to the teacher's comments with a minimum of 150-200 words within their group. Students are divided into two groups, while one group is assigned to come up with arguments for immigration to the US and the other with arguments against the issue.

Part 2

Students are divided into small groups of 3-4 students. Half of the number of groups will prepare themselves for a debate to argue in favor of immigration, the other half against. Students will use the forum discussion as a resource to extrapolate information for their arguments.

Immigration: Wie stehen Sie zu den Immigrationsproblemen zur Zeit in den USA? Sollte man illegale Arbeiter zulassen oder die Immigration strenger kontrollieren? Welche Regeln oder Maßnahmen würden Sie vorschlagen?

[What is your opinion about the immigration problems currently in the USA? Should illegal workers be given working visas or should immigration be controlled more strictly? Which rules or provisions would you suggest?]

Chapter 2

Interaction in Google Wave Sends Chat Rooms out with the Tide

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ABSTRACT

This chapter focuses on Google Wave, a new, emerging world-wide technology by Google that supports both synchronous and asynchronous communication. Research on this technology took place during two sessions of an advanced second language (L2) technology course whereby synchronous conversations in Google Wave were compared to synchronous conversations in Blackboard chat rooms. Students experienced both forms of technology while discussing cross-cultural and pedagogical discussions relevant to L2 learning. Structural comparisons in terms of message length, message turns, numbers of words, and clarification revealed that students were more patient and wrote lengthier, more complex posts when conversing in Google Wave as compared to the chat room. Students' impressions further confirmed their awareness of writing and reflecting more within Google Wave. These results suggest that Google Wave will support flexible, innovative learning and will provide researchers with multiple opportunities for expanding our understanding of students' interactions in synchronous environments.

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INTRODUCTION

Today's students are "digital natives", technologically sophisticated learners who process information differently than many of us did at their age (Prensky, 2001). Instead of being "native" to today's technology, many of us teachers are either "digital immigrants" or "naturalized digital citizens", brought into the digital world after experiencing, for the most part, an analog way of life. As this digital world continues to evolve, new technologies emerge and trends we once took for granted, say an interactive chat room, now face creative challenges that we never imagined possible. To support new trends, or to utilize new emergent technologies, we must understand how much such changes can potentially influence our students' learning as well as our own teaching.

The buzzword today is Web 2.0, an overarching technology paradigm that facilitates interaction between individuals, both socially and educationally. A sub-term in this Web 2.0 world, computer-mediated-communication (CMC), has long focused on the use of communication tools, such as synchronous chat rooms, to support collaboration, interaction, and rich, deep conversation both in and out of the classroom. Given that technology never remains static, it is no surprise that new applications and new trends emerge that literally "blow our minds"! It is, in fact, a new form of CMC that is the focus of this chapter, a new technology that has been projected to "wash away" how we interact, communicate, and collaborate electronically with each other. This new emerging tool is Google Wave, an online communication environment that supports multiple forms of interaction, including synchronous and asynchronous communication.

This chapter demonstrates how Google Wave can support synchronous conversation among students. In a recent advanced-level second language (L2) technology course, this researcher compared synchronous conversations in Google Wave to synchronous conversations in a standard

Blackboard chat room. Students enrolled in the course experienced both forms of technology while participating in cross-cultural and pedagogical discussions relevant to L2 learning. A structural comparison in terms of message length, message turns, numbers of words, clarification, and technical issues revealed the extent of students' expression in both formats. To present these findings, this chapter begins with a review of literature relevant to computer-mediated communication (CMC) and the emerging technology, Google Wave. The chapter next turns to the active research study that examines the extent to which Google Wave and chat rooms are similar and/or different when students synchronously discuss specific topics. The chapter then concludes with a summary of the results, and recommendations for teaching and research using this rich, innovative tool.

BACKGROUND

CMC and Learning

Web 2.0 technologies empower learners to develop cross-cultural understanding and pedagogical knowledge through exploration and discussion in a target and/or native language. Through interactive learning, individuals share knowledge, identity, experiences, and make connections in socio-collaborative environments such as chat rooms (Tu, Blocher, & Gayle, 2008). Vygotsky's sociocultural theory illuminates the role of social interaction for learning and it is his "Zone of Proximal Development", the zone between what a student knows and what he or she can aspire to know, that is particularly relevant to socio-collaborative learning (Vygotsky, 1978). Individuals and, in today's modern age, technology, both support students' progression through "the zone", support the achievement of a given activity, and can influence learning outcomes (Darhower, 2002).

Chat rooms have long been used to engage students in synchronous conversation given their simple interface and archiving capabilities (Warschauer, 1997). In its early stages, computer-mediated communication (CMC) was known for its anonymity not to mention its simplistic appearance (McKenna & Bargh, 2000). In a chat room, one simply typed a message and anonymity through pseudonyms made personality a great mystery, leaving users to wonder with whom they were really communicating (Joinson, 2001). Students' lack of ownership over the technological environment also tended to hamper their freedom to explore and construct knowledge based on their interests (de Bruyn, 2004; Pena-Shaff, Altman & Stephenson, 2005). Despite this, researchers found that chat rooms support different or more complex discussions than do face-to-face discussions (e.g., Chun, 1994; Kern, 1995; Warschauer, 1996). For example, Sproull and Kiesler (1991) found that chat rooms promote equal participation; students contribute without intimidation of nonverbal cues, such as frowns; race, gender and other differences are not pertinent to the communication process. Chat rooms, in fact, maintain features of both oral and written language. Characteristics similar to spoken language include real-time communication, stressed words and phrases using italics or bolding, and first person responses, while characteristics of writing include lack of intonation, a permanent record, some punctuation and other formatting, the ability to read and reflect, and the potential for interactive discussion (Smith, 2003).

CMC Participatory Research

Early chat room research focused primarily on counting and categorizing the comments of learners in comparison to other communicative approaches. Kelm (1992), Kern (1995), Sullivan and Pratt (1996) and Warschauer (1996), for example, compared chat rooms to face-to-face conversations and found that 100% of all students participated in the chat room discussions whereas face-to-face

participation was often 50% or less. Kelm (1992) more specifically found that synchronous CMC allowed for uninterrupted conversation and reduced student anxiety. Chun (1994) further discovered that students asked more questions, offered more feedback, and ended conversations appropriately rather than abruptly in their discussions.

In his often cited study, Kern (1995) found greater language production, enhanced complexity in expression, increased socialization, and reduced anxiety in chat room discussions as compared to face-to-face discussions. He further found that students took twice as many turns, produced up to four times more sentences, and used more discourse functions in the chat room than when engaged in an oral classroom conversation. Kern focused on "T-units", a "T(erminable)-unit" (Hunt 1970) represented by an independent clause and accompanying modifiers. He demonstrated that students' sentence lengths were much greater and more complex in the chat room than in face-to-face discussions. Specifically, up to 48% of all sentences in the chat room were 2 t-units or greater; less than 33% of all t-units in the classroom were 2 t-units or greater.

Other studies also examined the amount of discussion present within CMC. Poole (2000) determined that students who most frequently contributed to an asynchronous bulletin board typically had shorter messages than those who posted less frequently. Alternatively, Smith (2003) looked at "turns". That is, rather than counting sentences, he counted how often a new speaker spoke within the flow of the conversation. He found that students participated in negotiated interaction about one third of the time while two thirds of the time they focused on collaborative conversation. Unlike Werry (2003) who considered a 'long' sentence as six or more words, Al-Sa'di and Hamdan (2005) adopted eight words as the demarcation between short and long sentences. However, because typical E-English lacks punctuation marks and correct spelling, not to mention capitalization, these researchers

also analyzed the discussions based on sentence complexity using four types: simple sentences containing one clause; compound sentences containing two clauses; complex sentences containing at least one embedded clause with a grammatical function; and then compound-complex sentences. Simple sentences were the predominant type with complex and compound sentences also present; compound-complex sentences were practically non-existent. The researchers also found that some wrote “good English” with capitalization and correct spelling, but most used “linguistic economy”: short, simple sentences, and words spelled in unfamiliar or abbreviated ways.

CMC Discourse Research

With time, researchers began to examine chat room discourse. Darhower (2002) studied intersubjectivity, off-task discussions, greetings, departures, identity exploration, role-plays, and humor in synchronous discussions. He found that students adhered to substantive, coherent communication when social space was well maintained. However, if shared orientation broke down, coherent, substantive communication was lost. In particular, he found that students would go off-topic (signaled by more than five such statements in a row) when the teacher was absent from the discussion or when a student chose to abandon one topic for another. Thus, would others stay on task or would they follow the “off-tasker”? Darhower found that students would typically stay focused through topics of mutual interest, group integrity, jovial and playful interaction, experimentation with identities, and role plays.

Park (2007) examined the “linguistic tools” students use to communicate. For example, a highly transactional text would include nouns, adjectives, prepositional phrases and longer words. Interpersonal text would use first and second person pronouns, contractions, and conversational words such as “you know”, “sorta”, and so on. He found that group support is a primary characteristic

of collaborative chat room work, evident in the use of interpersonal features used to build rapport among participants. Thus, using someone’s name to promote turn-taking, along with informal communication, contributed to the development of collaborative rapport among the students.

Stacey (1999) also explored discourse in CMC discussions and found that students spend time on-topic, sharing ideas and perspectives, clarifying issues, and negotiating meaning but also off-topic, discussing technical issues, commitment to the group’s activity, and managing issues relevant to the group’s existence. Paulus (2009) examined just what students talk about when not focused on the topic at hand and found that most off-topic interaction surrounded either logistical or technological concerns (relevant to completion of the task at hand) and social issues. However, to return to conceptual concerns (relevant to the discussion objectives), students would find “common ground” by being responsive, responsible, and relational in their discussions. Paulus (2009) suggests that CMC discussions be balanced and include open-ended discussions that are less focused on detail, that students learn strategies to reinforce grounding, and that group membership remain unchanged so as to reinforce such approaches in conversation. Previous studies, in fact, have demonstrated the helpfulness of building and maintaining community among learners (Boulos, Taylor, & Breton, 2005; Cox, Carr, & Hall, 2004; Curtis, 2004). Wang and Chen (2007), for example, found that chats help provide a sense of membership in a class, enhance class performance, and decrease the distance felt with other students.

CMC Research Models

In other relevant CMC studies, researchers have created numerous models and approaches to examine the discourse present in CMC activities (e.g., Darhower, 2002; Garrison, Anderson & Archer, 2001; Thomas, Clift, & Sugimoto, 1996).

Gunawardena, Lowe, and Anderson (1997), for example, outlined five possible steps in a CMC discussion including: 1) sharing and comparing information; 2) exploration of understandings and misunderstandings; 3) collaborative knowledge construction; 4) testing of resulting co-construction; and 5) cooperatively constructed meaning. They found that students most often remain in step 1, sharing and comparing their information. Garrison, Anderson and Archer's (2001) model also examined four specific items within CMC: 1) the triggering event, whereby one recognizes or identifies issues to be discussed through questions or background information; 2) exploration, whereby students explore and exchange information such as asking if they are "making sense"; 3) integration, or how students respond based on the thoughts and ideas of others, printed material, and personal experiences; 4) resolution, that is, how one makes connections to real world scenarios and assesses the results. Within their research, they found that students were most engaged in item two, the exploration phase, as they interacted within a CMC environment.

CMC Moderator Research

Research on CMC has also demonstrated that students prefer the presence of a moderator to support successful online interaction (e.g., Darhower, 2002; Hara, Bonk, & Angeli, 2000; Pérez, 2003; Russo & Benson, 2005; Stepp-Greany, 2002). Bayer (1990) remarked that a teacher must be a "guide on the side" to assist students as they share ideas and their prior knowledge. Nickel (2002), however, believes that there is a risk of the teacher playing too much of a role in the discussion, eliminating the freedom of students to fully express themselves. Heckman and Annabi (2005) further believe that too much moderation can eliminate the ability of students to spontaneously moderate elements of the discussion. And yet, when the moderator is minimally present, students may more easily go off task (Light, Nesbitt, Light, &

White, 2000). Ortiz-Rodriguez, Telg, Irani, Roberts, and Rhoades (2005) suggest that instructors can improve students' interaction by developing questions and keeping the conversation focused on the topic at hand while encouraging active student participation. Others have determined that un-moderated discussions can be successful if one develops, ahead of time, a common understanding of the discussion's purpose (Galanouli & Collins, 2000; McConnell, 1994).

CMC Drawbacks

Despite the numerous benefits of CMC chat rooms for effective interaction, not to mention the varied research foci undertaken, numerous drawbacks exist in chat room interactions including, but not limited to, a student's poor keyboarding skills, slow reactions to responses given, the absence of nonverbal communication, confusing discussions, and the unfortunate question that never receives a response (Salaberry, 1997). Additionally, participants miss information if they log in late to the discussion, multiple threads of conversation often occur simultaneously, and too many speakers can lead to incoherent discussion. To counter confusing interaction in a chat room, Smith (2006) developed a form of "chatiquette" to foster courtesy, respect, and clear communication. Within his system, a student would type in an exclamation mark, a hand raise if you will, when ready to participate. A question mark would indicate the desire to ask a question, and the word "new" would signal the desire to change topics. Any of these "chatiquette" markers could be used at any time and students would simply need to comply with the order of requests. Smith (2006) found that as students became used to this etiquette, they became more productive discussants.

Google Wave

Chat rooms have been around for quite some time. However, our web paradigm is ever evolving and

today, social networking is the predominant CMC focus with users world-wide engaged in such interactive activities as Facebook and YouTube. Email and instant messaging continue as predominant tools but the wave of the future, Google Wave, is now sitting high on the horizon. This new communication tool, a potential replacement or supplement to such technologies as email and wikis (Rethlefsen, 2010), allows multiple individuals to work collaboratively, either synchronously or asynchronously, through collaborative editing. No matter when one joins a “wave”, the interactive placeholder for a discussion, one can see the evolution of an entire interaction from start to finish, with a play button that reveals, step by step, any comments or changes made. Using Google Wave as a chat room, a student can arrive late to a discussion, they can see the entire conversation unfold before their eyes, and can see messages as they are typed. Google Wave also allows precise insertion of comments or questions into the conversation; images, movies, maps and sounds can be incorporated into the discussion, from the computer’s desktop, thereby enhancing creativity of thought and presentation. Confusion and chatting jams subside; “wavers” see and know who their co-discussants are.

Google Wave does not, however, come without its own set of challenges. To begin, it truly is almost impossible to describe (Grossman, 2009), and as more participate in a discussion, overall performance declines. As Rethlefsen (2010) points out, Google Wave demands that you think before typing as it reveals what you are thinking or saying as you type. Others believe it is “Not. A. Good. Idea.” for everyone to see what is being typed as it is typed (Douglis, 2010, p. 5). And too, the learning curve is steep; with its increased functionality, one must spend more time learning to use it effectively (Stuart, 2010). Despite these seemingly large drawbacks, Google Wave is a highly flexible collaboration and communication tool; it is the new, emergent wave of the future.

The Internet is a vast anthropological resource, rich with cultural information and users from all walks of life. Because it is so new, Google Wave offers an ocean of opportunities for researchers to examine just how individuals can interact and construct knowledge within this environment. As a starting point to research, this current study examines how conversation mechanics vary between the typical chat room and Google Wave technologies when used synchronously. This comparison is essential for the following reasons: In a true chat room, conversation is linear and typically flows incoherently from one statement to the next; a new question can be posted while comments to previous questions are made immediately after. Google Wave, on the other hand, allows for synchronous conversation but differently: As students write questions and comments, all see that they are actively engaged in expressing themselves; comments can be placed wherever desired into the conversation thereby removing the rigid linear flow that is present in the chat room. And too, if a student arrives late to the conversation, there is no penalty; the student can review all that has been said prior to arrival.

Previous chat room research has shown that students tend to write longer, more complete phrases as compared to face-to-face classroom conversations (Kern, 1995). Others have argued that we must examine students’ interactions to determine how best to utilize CMC in learning (O’Malley, 1991; Paulus, 2007). Kirschner, Strijbos, Kreijns, and Beers (2004), in fact, encourage researchers to consider what learners actually do when engaged in CMC discourse. Therefore, can Google Wave better support students’ expression and interaction with each other as compared to a typical chat room? Therein lies the current research question: To what extent does conversation vary between a Google Wave and a Chat room discussion? Are there differences present or is Google Wave just another chat room in sheep’s clothing?

Methodology

This study took place during two class periods of an advanced-level course focused on L2 teaching and technology and cross-cultural development during the spring of 2010. Participants included two German language students, six French language students, and one student of ESL education; four students were masters-level graduates and five, senior-level undergraduates. Because of the presence of varied target languages and the desire to support rich discussion of the topics in both CMC environments, all activities took place in English.

In preparation for this activity, students were first trained in the use of Google Wave and completed an in-class discussion using the Google Wave environment to ensure that all understood how to navigate and communicate fully with this technology. Since students were already familiar with Blackboard's chat room environment, training in the use of this technology was not warranted. Next, students participated in this study over the course of two class periods. During the first class period, 1 hour and 50 minutes in length, students discussed two articles focused on blogging and L2 learning (Hsu, 2008; Pena-Shaff, Altman & Stephenson, 2005). One half of the class interacted in the chat room environment (CR 1) and the other half, in Google Wave (GW 1). During the following class period, also 1 hour and 50 minutes in length, students discussed two chapters focused on the Brazilian Samba and the Mexican Fiesta and the presence of such metaphors in their target cultures. This time, roles were reversed; those who had previously interacted in Chat Room 1 were now in Google Wave (GW 2); those who were in Google Wave 1 previously were now in the chat room environment (CR 2). During both class periods, and in both CMC formats, the teacher facilitated discussions with sets of prepared questions to keep the conversations as equally focused as possible so as to support later comparisons and analyses. Though the teacher participated in both conversations, students were primarily left

to discuss the material amongst themselves so as to allow their own thoughts and ideas to emerge from their interactions with classmates.

The research had both a quantitative and qualitative focus. From a quantitative perspective, the influence of the statistical analyses stemmed from Kern's (1995) seminal research focused on language production. Whereas Kern compared chat room activities to in-class conversation activities so as to examine language production and complexity of expression, the quantitative aspect of this present study focused on a comparison of language production between the chat room environment and the new technology, Google Wave. Thus, all conversations were analyzed to determine where any significant differences exist with regards the number of posts, number of words, lengths of posts, numbers of off-topic discussions, technological needs, and E-English. Simple statistics such as sum totals, percentages and averages were used in this study. However, additional more sophisticated analyses such as pair-wise comparisons and analyses of variance helped reveal significant correlations present between words and posts written in both CMC formats. From a qualitative perspective, this study proposed to offer additional evidence of the quantitative results through the students' voices. Thus, students provided opinions, through both aural and online synchronistic conversation, about the two CMC tools; their statements reinforced many of the statistical results found in this study.

RESULTS

Figure 1, Part A, presents the number of posts present within both forms of CMC. Pair-wise comparisons revealed significant differences between CR 1 and both Google Wave (GW) groups (CR 1 to GW 1, CR 1 M=90.75, GW 1 M=26.5, (Mean Difference)MD=64.25, $p<0.0079$; CR 1 to GW 2, CR 1 M=90.57, GW 2 M=38.75, MD=52, $p<0.0052$) such that there were significantly more

Figure 1. Part A: Number of total posts written in individual and combined CMC groups; Part B: Number of words present in each individual and combined CMC group.

Part A	CR 1	GW 1	CR 2	GW 2	Total CR	Total GW
Students	363 (88%)	106 (74%)	338 (91%)	155 (82%)	701 (89%)	261 (79%)
Moderator	50 (12%)	37 (26%)	33 (9%)	34 (18%)	83 (11%)	71 (21%)
Total	413	143	371	189	784	332
Part B	CR 1	GW 1	CR 2	GW 2	Total CR	Total GW
Students	3,292 (81%)	3,511 (79%)	4,088 (89%)	2,953 (84%)	7,380 (85%)	6,464 (81%)
Moderator	755 (19%)	905 (21%)	518 (11%)	560 (16%)	1,315 (15%)	1,465 (19%)
Total	4,047	4,416	4,606	3,513	8,653	7,929

student posts present in CR 1 compared to either Google Wave group. A pair-wise comparison of combined chat rooms to combined Google Wave discussions also revealed a significant difference, (GW M=32.635, CR M=78.875, MD=46.25, $p<0.0016$), such that there were significantly more student posts present in the combined CR discussions as compared to the combined GW discussions.

Despite the overall significantly higher number of student posts in the chat room, as compared to Google Wave, the number of written words was far more equal in all four discussions with no significant differences present between groups or between CMC formats (Figure 1, Part B).

A correlation analysis between the number of combined student posts and the number of combined student words in the chat room and in Google Wave revealed a significant positive cor-

relation such that the more posts a student wrote within a chat room, the more words they wrote as well ($r=0.683579$, $p<0.0423$). There was no significant correlation in Google Wave between the combined posts and words. However, examining each individual group, a correlation was present in CR 1 ($r=0.916135$, $p<0.0288$), and in GW 1 ($r=0.912064$, $p<0.0309$) such that the more students actively posted, the more words they wrote as well. There was no significant correlation in any other group though a trend was present in GW 2 ($r= 0.870419$, $p<0.0549$).

The researcher also examined the length of students' posts, based on the number of words present divided by the number of posts, and found that 52% of all chat room posts were 8 words or less while 22% of all Google Wave posts were 8 words or less (Figure 2).

Figure 2. Length of posts within each individual and combined CMC groups.

Words per Post	CR 1	GW 1	CR 2	GW 2	Total CR	Total GW
1-8	205 (56.4%)	13 (12.2%)	159 (47%)	45 (29%)	364 (52%)	58 (22.2%)
9-16	97 (26.7%)	20 (19%)	97 (28.6%)	37 (24%)	194 (28%)	57 (21.8%)
17-24	47(12.9%)	17 (16%)	45 (13.4%)	22 (14%)	92 (13.2%)	39 (15%)
25-32	12 (3.3%)	11(10.3%)	20 (6%)	20 (13%)	32 (4.5%)	31 (11.9%)
33-40	1 (.035%)	11 (10.3%)	6 (2%)	17 (11%)	7 (.09%)	28 (10.7)
41-48	1 (.035%)	10 (9.4%)	7 (2%)	6 (4%)	8 (1%)	16 (6.1%)
49-56	0	5 (4.7%)	0	4 (2.5%)	0	9 (3.4%)
57-64	0	7 (6.7%)	1 (.02%)	3 (2%)	1 (.01%)	10 (3.9%)
65-72	0	4 (3.7%)	2 (.05%)	1 (.05%)	2 (.02%)	5 (2%)
73-80	0	3 (3%)	1 (.02%)	0	1 (.01%)	3 (1.1%)
81-88	0	0	0	0	0	0
89-116	0	5(4.7%)	0	0	0	5 (1.9%)

Interaction in Google Wave Sends Chat Rooms out with the Tide

Figure 3. Average number of words per post in each individual and combined CMC group.

	CR 1	GW 1	CR 2	GW 2	Total CR Avg.	Total GW Avg.
Average words per student post	9.06	33.1	12.09	19.05	11.28	25.02

The above differences can be further explored by examining the average number of words per post. Using a pair-wise comparison, students' CR posts were found to be significantly shorter on average than their GW posts (CR M=11.28, GW M=25.025, MD=13.74, $p<0.0061$) (Figure 3).

Further analysis revealed no correlation between the number of posts and the average number of words within a post. However, within the chat room environment, a negative correlation trend revealed that the more posts one made, the shorter the sentence lengths ($r=-0.59967$, $p<0.0878$). Given that Google Wave promotes significantly lengthier posts based on the number of words present, the researcher also examined the number of phrases present within each post (Figure 4). While not significantly different, these results demonstrate that GW discussions are potentially more complex than are CR discussions.

The study also analyzed students' use of capitalization, punctuation, and the presence of misspelled words within both CMC styles. Capitalization and punctuation refers to the number of posts that began with capitalization and the

number of posts that ended with appropriate punctuation such as a period or a question mark. Misspelled words refers to the total number of words not spelled correctly within each CMC group. As can be seen in Figure 5, students made greater use of capitalization within the Google Wave environment as compared to the chat room environment such that 57% of all Google Wave posts began with capital letters while only 32% of all chat room posts began with a capital letter. These results were not significant. However, a significant difference was found (GW M=63.2, CR M=29.15, MD=34.07, $p<0.0129$) such that students made greater use of appropriate punctuation in Google Wave compared to the chat room. Additionally, while not significant, students had fewer spelling errors in Google Wave as compared to the chat room.

A final analysis examined the un-focused discourse of each conversation such as greetings, departures, off-topic posts, clarification, and technological needs (Figure 6). No significant differences emerged. It is interesting, however, that both chat room discussions contained clari-

Figure 4. Number of phrases per post within all Google Wave and Chat room groups.

	CR 1 (363 posts)	GW 1 (106 posts)	CR 2 (338 posts)	GW 2 (155 posts)	Total CR (701 posts)	Total GW (261 posts)
Single Phrase	348 (96%)	37 (35%)	292 (86.4%)	97 (62.5%)	601 (91.1%)	134 (51.3%)
Two Phrases	14 (3.8%)	35 (33%)	40 (12%)	43 (28%)	54 (8%)	78 (30%)
Three Phrases	0	23 (22%)	5 (1.4%)	14 (9%)	5 (.07%)	37 (14.8%)
Four Phrases	0	6 (5.5%)	1 (.02%)	1 (.05%)	1 (.01%)	7 (2%)
Five+ Phrases	1 (.02%)	5 (4.5%)			1 (.01%)	5 (1.9%)

Figure 5. Presence of written formatting in both CMC environments.

	CR 1 363 posts	GW 1 106 posts	CR 2 338 posts	GW 2 155 posts	CR Total 701 posts	GW Total 261 posts
Capitalization by posts	162 (44%)	65 (61%)	84 (25%)	80 (52%)	246 (32%)	145 (57%)
Punctuation by posts	65 (18%)	90 (84%)	120 (36%)	68 (44%)	185 (29%)	158 (63%)
Misspelled words	31	14	43	8	74 total	22 total

fication statements whereby one needed assistance in understanding the flow of the discussion. No such phrases emerged in any Google Wave discussions.

DISCUSSION

Preliminary analyses reveal that students posted much more in chat room discussions as compared to Google Wave discussions, $p < 0.0016$. Given the rapid pace of chat rooms and given that Google wave allows all discussants to see posts as typed, students, perhaps, utilized more patience in their reading and writing in Google Wave as compared to the chat room. Within the chat room, students wrote quick, brief posts, most often one phrase in length, not knowing what might be said next or by whom, but resulting in a higher number of posts. Students' own comments supported these conclusions, commenting, in particular, on the fast pace of the chat room: "It seems like in the chat room people say more, cause it's faster or cause people can't see you typing...but while I'm typing [in the chat room] the conversation is moving by too quickly". Such a fast pace resulted

in quick responses to get one's point across: "In the chat room, I panic because I want to get my comment out before the conversation moves too far away from what I'm commenting about." This is counter to Kelm's (1992) finding that CMC leads to reduced student anxiety in sharing, at least in terms of comparing face-to-face conversation to a chat room activity. The question of whether Google Wave can reduce anxiety beyond that of a chat room bears further examination.

Counter to such views, students spoke of the pace within Google Wave, one that suggests patience rather than "panic": "Google Wave prevents the 'talking over one another' that happens in chat rooms. If you start to type a comment here, but then you see someone else is typing, you might hold off a minute." Such patience was believed to keep one more deeply focused on the interaction:

"One thing about chatting vs. waving is that you can see when someone is responding [in Google Wave] and wait for their comment instead of everyone writing [in the chat room] and it popping up all over the place; maybe that can allow for deeper discussion in Google Wave."

Figure 6. Off-topic and conversation strategies present in each CMC discussion.

	CR 1	GW 1	CR 2	GW 2
Clarification Posts	4	0	11	0
Greetings	5	5	0	0
Departures	4	2	0	0
Off-Topic Posts	6	8	8	5
Technology Issues	3	3	0	6

Interaction in Google Wave Sends Chat Rooms out with the Tide

Simply put, Google Wave shows you what's going on whereas potential statements or questions in a chat room remain a mystery until revealed, but only with further potential mysteries lurking directly behind: "In Google Wave, I know exactly where the action is happening... The chat room just seems like a snowball rolling along and connecting bits and pieces."

Chat rooms had significantly more posts because of the "rush to speak"; Google Wave had fewer posts because of the patience eluded from the technology itself and the ability to see as one types. However, the relatively equal number of words present in both CMC formats and the demarcation of a short versus long sentence at 8 words or less (Al Sa'di & Hamdan, 2005) demonstrates that Google Wave posts were significantly longer albeit fewer than chat room posts ($p < 0.0061$). Additionally, a negative correlation trend present in the chat room suggests that the more posts students wrote, the shorter in length were their posts ($p < 0.0878$). Poole's (2000) study supports this trend in that students who most frequently contributed to the class discussion in his study had somewhat shorter messages than did those who wrote fewer posts. Thus, 52% of the chat room posts were short (8 words or less) as compared to 22% of Google Wave sentences, while 91% of all chat room posts were one phrase in length but 59% of Google wave posts were two phrases or more in length. Clearly, students wrote more and expressed themselves in a much more complex fashion in Google Wave as compared to the chat room. Kern's (1995) own study found greater sentence length and an increase in complexity of expression in a chat room as compared to face-to-face discussions. In this current study, we see a similar trend between the two CMC tools. With the increased length of sentences and the increased presence of phrases per post, one could argue that more thoughtfulness and reflection exists within the Google Wave environment as a result:

"I probably think more deeply in the wave. I think that automatically when I use something like a chat room, I think back to my days of instant messaging, and I didn't usually have very engaging conversations on there. So now, even many years later, I have it in my head that chat/IM isn't as deep."

This brings to mind the amount of invested mental effort (AIME) (e.g., Cennamo, 1993; Jones, 2008; Salomon, 1981) present and whether or not students' beliefs about the easy or difficult nature of chatting or IM-ing or waving would influence educational outcomes in either CMC tool. The current belief is that the chat room is simply fast-paced and does not promote deep thinking: "Yes, you can think better here [in Google Wave] as opposed to the 'hurry up' mentality of the chat room." But pace aside, the fact that one could place comments where desired into the discussion enhanced the quality of the conversation within Google Wave: "I like that thoughts or responses are connected in the wave." Such connections and organization meant that they could delve more deeply into topics: "I feel like on Google Wave there is an opportunity to go deeper into several things at once, but on chat you can only go deep into one thing at a time."

Given that students wrote significantly longer posts in Google Wave, both patience and depth of thought seem to be logical explanations for this outcome. However, the technological design of both CMC tools remains curiously absent from the discussion. The chat room box into which one writes is much smaller than that of Google Wave. As one writes in Google Wave, the box expands and all text written remains visible. In the chat room, the size of the box does not adjust as one types and one may feel compelled to end more quickly rather than continuing to write. Transcripts of students' interactions reveal that in terms of "turns" (Smith 2003), students sometimes wrote 2 and 3 short posts in a row in the chat room, getting

their comments out piecemeal; in Google Wave students never spoke more than one turn at a time.

Students seemed more cautious in writing “correctly” within Google Wave as compared to the chat room. Analyses revealed that many more posts, on average, began with capitalized words and ended with appropriate punctuation within Google Wave compared to the chat room; fewer misspelled words emerged in Google Wave as well. Since students were being “observed” as they wrote, one can presume that they wanted to “get it right”, resulting in more proper writing within Google Wave:

“I think it is interesting to see the differences in tone. We all seem to be a little more formal in Google Wave (capital letters most of the time, for example). In the Chat room, it felt more like twitter to me—all lower case letters, abbreviations...”

Perhaps the existence of a more formal writing strategy stems from the fact that “everyone is watching” as one types, but also, once a comment is posted into Google Wave, one can return to it and edit it: “I just like the idea that you can edit everything and you can make it more understandable.” Google Wave simply supported more accurate and lengthier writing than did the chat room.

Students never asked for clarification on comments within Google Wave perhaps since they had the ability to place their posts directly under particular questions or comments. As a result, thoughts flowed more logically within Google Wave. Within the chat room, conversation flowed linearly, post after post, with confusion always a possibility: “In the chatroom, comments get mixed up; plus, on here, the comments aren’t spaced out clearly so all the words just run together, or there are too many words coming quickly.” Students were quite cognizant of the lack of coherence within the chat room: “I think comments get lost or ignored when you chat.” Several, in fact, spoke of the “ghost-posts”, comments or questions in a chat room that go unnoticed: “A few of my

comments ended up being irrelevant because by the time I got done typing, we’d moved on to something else.” The beauty of Google Wave was its lack of a rigid linear flow. At any time, one could comment on others’ posts or even return to his or her own post and edit it: “I think that thought is more linear in the chat room. Here, in the wave, it feels like your thoughts keep going, and you can reflect on something you said before, or change it.” The danger, however, was that one would have to scroll back to see if new material had been or was being added or changed in Google Wave as well. As a result, just as in the chat room, a “ghost-post” could likewise emerge in a wave. Despite this, the ability to clearly talk about multiple items at once seemed appealing to students: “I was able to consider multiple things at once in Google Wave, whereas in the chat, I had to focus on one thing at a time.”

In terms of technology woes, the chat room received better reviews; students in both Google Wave groups experienced some lag time in seeing others’ posts, rendering the current beta version of Google wave a bit problematic at this point. And too, students in both CMC environments fell into the typical strategy of off-topic discussion. Numerous researchers have identified this as normal, a regular part of online interaction (e.g., Stacey, 1999; Paulus, 2009). The number of off-topic posts, however, was few in number and could well be because, as Paulus (2009) suggests, the CMC discussion included open-ended questions that were less focused on detail and instead were richly supported by experiences and opinions offered by the students. In short, the tedious boredom of discussing facts and figures did not come into play to edge them towards off-topic material. Additionally, in both environments, the teacher brought students back to the topic at hand with identical questions whenever off topic comments began; there was little room to wander away from the discussion. It is interesting too that in the first day of discussion, students posted greeting and departure messages in both CMC technologies.

In the second day of conversing, no greetings or departures emerged in their discussions. While Stein et al. (2007) identified a typical pattern of social re-acquaintance that occurs each time one gathers to chat, the current study did not follow suit. Social re-acquaintance seemed unimportant to the students; the groups were small, students were well acquainted with each other, class membership was already well established (Wang & Chen, 2007), and once logged in, the discussion began.

Despite its current bugs, students overwhelmingly favored Google Wave, its ease of use, its cleaner view of the entire conversation. However, their favorable views were not without some criticism. In particular, the visibility of one's thoughts as typed was of concern, even though earlier, students suggested such a strategy promoted patience: "I like that you can't read what I am typing as I am typing [in the chat room]." Though several agreed with this point, the presence or absence of seeing words as they are typed tended to influence students' behavior toward the activities: "I think on the chat room I tend to sit back more and read, because it's so streaming but I think with the Google Wave, I'm paying more attention because I can see the typing." And even with its posts, chat rooms felt more like activities that one could revisit much more easily than the wave:

"I feel like I have to pay more attention in the wave because I feel like I need to see what is going on in real time to understand the conversation. With a chat, you can forget about it for a few minutes and then scroll through what you missed really quickly."

We often use chat room strategies to supplement or compliment classroom conversation, in particular in L2 courses. Because we want the experience to be as close to real-life conversation as possible, there is great hope in what students will experience with Google Wave. Comments in this study reflected favoritism toward Google Wave and its conversational style: "When people

are typing, you have to wait for them to finish. So in that aspect, Google Wave is like talking, which I like." Even more related to conversation, one student commented: "People interrupt all the time in the middle of someone else speaking. Google Wave actually feels like a voiceless conversation, where you can interrupt other people and everything." Thus, as Smith (2003) previously found, characteristics of both writing and speaking are present in CMC and, in this instance, in Google Wave. But, students thankfully did not fall into the trap of writing "monologues", posts where a student dialogues for an extended period of time with no room for further commenting or questioning on the part of fellow discussants (e.g., O'Dowd, & Eberbach, 2004; Williams, Watkins, Daley, Courtenay, Davis, & Dymock, 2001). Instead, conversation remained constant throughout both forms of CMC, albeit, with lengthier posts present in Google Wave followed immediately by further comments and questions.

SOLUTIONS, RECOMMENDATIONS, AND FUTURE RESEARCH DIRECTIONS

Clearly Google Wave impacted students' expression in ways not previously seen in the typical CMC chatroom environment, in particular in terms of length of posts, numbers of posts, patience and clarity. The opinions and results also suggest that Google Wave may well promote deeper conversation, deeper reflection and, potentially, deeper learning. Thus, the research on Google Wave is far from over. In fact, it has only just begun and if history holds true, pioneers of chat room research such as Kern (1995), who began with analyses of the structure of CMC conversations, will serve as future guides into comparative studies of the depth of conversation present within Google Wave. Research therefore must continue to fully determine the impact Google Wave can and will have on education. Already, recommendations

based on this current study and other experiences suggest that future teaching and research explore the following:

1. Examine the depth of expression and reflection within the two environments to determine how Google Wave can impact L2 conversation both synchronously and asynchronously. This current study focused on L2 teaching and cultural topics but through the use of the English language. How will the use of Google Wave in an L2 course effect students' level of conversation?
2. Examine the use of visual and verbal expression in Google Wave and how that impacts knowledge construction. Though not a part of this current study, Google Wave does allow one to embed images, links and video into a synchronous discussion. Knowing from previous research the value of images for communicating information in a target language (e.g., Jones, 2004; Jones & Plass, 2002; Pouwels, 1992), further study could provide greater understanding of the influence of images on knowledge construction in a L1 or L2 synchronous discussion.
3. Examine the role Google Wave can play in enhancing interaction with students of other cultures who do not speak a common language. Google Wave's language translation capabilities allows a conversant to type in one language and the co-conversant to see the message in a different language. How can this technological tool further support learning between speakers of different languages striving to develop greater cultural knowledge?
4. Examine the amount of invested mental effort (e.g., Cennamo, 1993; Jones, 2008; Salomon, 1981) present in a chat room environment as compared to a Google Wave discussion. Students in this study suggested that IM-ing was old hat, too automatic, and felt that they did not have to delve as deeply into the material as they would in Google Wave. What might we find with regards students attitudes and beliefs of chatting or Google Waving and the subsequent learning that takes place within these two CMC environments? And too, how will our instruction, guidance and attitudes as teachers influence students' attitudes and interaction as well?
5. Examine the design of the two technologies and the influence of the small versus large input boxes for typing. It is possible that the size of the input box may have influenced the length of students' postings in this study. Further discussion with students about the design of these technological tools may reveal their willingness to express themselves more richly in one format or the other.
6. Examine the cost effectiveness of Google Wave and/or chatrooms. Sanders (2006) has already called for further research on how CMC tools can save money in the education arena. In a fairly recent study, he compared Spanish students' chat experiences during versus outside of class time. Transcripts, analyzed for duration, turns, words, vocabulary, appropriate comments and off-task comments, demonstrated that production was greatest when chatting occurred outside of class, suggesting that students are fully capable of responsible collaboration on their own time thereby leaving class time for other activities. Salaberry (2001) also reveals a long history of referring to technology as cost-effective and suggests that one should examine how CMC can be an efficient use of human and technological resources. In my own experience with Google Wave, considering it time saving or "class saving", the tool salvaged the potential loss of a day's worth of discussion during one of our Mid-Western snow days; we held class online using Google Wave rather than cancelling class or demanding students travel on icy roadways.

7. Examine the collaborative editing capabilities of Google Wave. For years, collaborative writing and editing has been a part of L2 teaching and learning. Google Wave fully supports collaborative writing and editing whereby groups of students could come together to create a text with step-by-step participation visible as a part of the editing process. An examination of how such synchronous and asynchronous writing/editing can enhance students' learning is also warranted.

CONCLUSION

This initial study of Google Wave, an emerging world-wide technology, has demonstrated that students write more patient, lengthier, complex posts when compared to their discussions within a chat room environment. Students' impressions of this technology also confirm their awareness of writing more, reflecting more, thinking more as a part of the interactive process. While more analysis can and must be done on such interactive activities, I personally cannot wait for teachers and researchers to fully engage themselves in Google Wave, both educationally and intellectually. This technology, now available without need of an invitation, will provide teachers and researchers with a multi-purpose, innovative, flexible learning environment complete with numerous teaching and research possibilities. Google Wave will greatly enhance just how we all collaborate and communicate with others in first and second languages. It is the wave of the future... catch it!

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KEY TERMS AND DEFINITIONS

Asynchronous Communication: Communication that takes place within a CMC environment whereby participants are not engaged, at the same time, in the writing process. Email, bulletin boards and Facebook are examples of CMC asynchronous technologies.

Chat Room: A technology that supports online, synchronous communication between multiple participants. The flow of the conversation is technologically linear with text written blindly until posted to the discussion.

Clarification Posts: These posts, typically found in a chat room, signify the need to clarify confusing aspects of a discussion. They could be in the form of a question or comment and signify that elements of the conversation have been lost.

Computer-Mediated-Communication: A descriptor for online communication within the Web 2.0 environment that supports interaction either synchronously or asynchronously. Examples of computer-mediated-communication include email, chat rooms, Google Wave, bulletin boards, and Facebook.

Google Wave: An emerging technology, in beta form, that promotes both synchronous and asynchronous communication. This technology supports pictures, video and links and provides constant opportunities to edit posts and discussions among its users.

Off-Topic Posts: Messages within a synchronous or asynchronous discussion that are not focused on the content of the current topic being discussed.

Synchronous Communication: Communication that takes place within a CMC environment whereby participants are engaged, at the same time, in the writing process. Chat rooms and instant messaging are typical examples of CMC synchronous technologies.

Chapter 3

The Effect of Feedback in Teaching Thai as a Foreign Language

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ABSTRACT

This chapter aims to explore the effect of providing multiple sources of feedback through a language teaching approach called the Somatically-enhanced Approach (SEA) (Zhang, 2006) in the teaching of Thai language to foreigners. Teaching innovations include: the use of relaxation techniques to relax students; the use of humming, clapping, mouthing, and physical gestures to emphasize the rhythm of the Thai language; the use of a Speech comparison tool (Sptool) for providing biofeedback; and the provision of all learning materials on CDs. Two groups of students were involved in the study. An experimental group (EG) consisted of 24 international students who enrolled in the Thai Language for Foreigners course at Khon Kaen University, Thailand. These students came from People's Republic of China, Vietnam, and Laos. They were taught using SEA. The control group (CG) consisted of 22 Chinese students who studied Thai language at Guangxi University for Nationalities, China, taught with the traditional method. The results of this study revealed that after 24 face-to-face contact hours over 8 weeks, international students who undertook a course in SEA spoke more fluently than the control group who studied Thai for 44 hours over 11 weeks. The differences in the quality and quantity of speech were statistically significant. The results of the study, both quantitative and qualitative, will be reported. The improved gains in students' performance in EG can be attributed to the multiple sources of feedback afforded by SEA.

INTRODUCTION

Receiving good quality feedback is an essential aspect of language learning especially at the beginning stages of learning a foreign language. Feedback is important because it is essential for teaching to be turned into learning and can play a significant role in students' development by providing the knowledge required for improvement (Hinett, 1998; Hyland, 2000). However, in order for the feedback to be effective, two objectives must be met: (1) to enable students to make sense of the feedback; and (2) to establish a common understanding of how this feedback may be implemented or acted upon by students (Fraser, 2001; Zhang, 2006).

In a language learning classroom error correction, body language, non-verbal behavior, facial expressions, gestures, and tone of voice are all used in communicating feedback. Such feedback is usually instantaneous, involuntary (from the feedback provider), episodic and disappears very quickly from the memory of everyone involved. The feedback we have just described ignore the learners' involvement in the feedback process. As far back as Morley (1994) stressed that new instructional design in teaching pronunciation should not only take into account of language forms and functions but also issues of learner involvement and learner strategy training. While this objective was achieved by asking students to reflect on their learning experiences in Vitanova and Miller's study (2002), this study adopts a different technique. We designed a learning environment for learning Thai as a second/foreign language in which students were actively involved in utilizing a range of strategies in their process of learning. In this way, students not only learned through receiving feedback from the teacher, they also learned to attune to their own bodies and listened to feedback from their own body. Another source of feedback was the use of a speech analysis tool (Sptool) (Zhang & Newman, 2003) for offering audio and visual feedback and

course data CD-Rom. This speech tool allows the incorporation of a visual representation of a student's production to be easily compared to the speech of a native speaker. We contend that the multiple sources of feedback obtained through the combination of various feature of SEA, Sptool and the dataCDrom will make the process of understanding and acting upon feedback t easier and more accessible to students.

This chapter consists of the following sections: (1) a discussion of the theoretical framework that informs the study; (2) a discussion of the teaching context and method offering various forms of feedback; (3) a detailed description of the various features of the speech tool; and (4) results of a study involving a group of beginning foreign students learning Thai in a Thai and a Chinese university.

THEORETICAL UNDERPINNING OF THE STUDY

What happens to a beginner's perceptual system when one first starts to learn a foreign language? In the context of learning a foreign language, a person with normal hearing in his/her mother tongue will behave as though he/she were hard of hearing (Lian, 1980). Acoustically, each language sound carries all frequencies from about 50 Hz to about 16,000 Hz (albeit at various intensities). Theoretically, at any rate, each sound can be heard in many different ways. The ear seems to have a 'choice' as to what to hear in practice depending on the way the ear has been trained. L2 students tend to make 'choices' in the target language based on what they are familiar with in their mother tongue. Trubetzkoy (1939) refers to this as the mother tongue 'sieve'. For instance, a vowel is physically made up of a complex set of many frequencies produced simultaneously. When a vowel is heard, everything it contains is heard. However, when listening to a sound, it is not necessary to catch all the elements in order to recognize it as recognition only requires some of

Figure 1. “L'appareil Suvaglingua, instrument de recherché et de correction phonétique”, R.P.A., 4, 1967, notes 13 and 14, pp. 62 and 63. Taken from (Renard, 1985)

between 150 and 300 cps, we hear [u]
between 300 and 600 cps, we hear an intermediate sound
between [u] and [o]
between 400 and 800 cps, we hear [o]
between 600 and 1,200 cps, we hear [ɔ]
between 800 and 1,600 cps, we hear [a]
between 1,200 and 2,400 cps, we hear [ɛ]
between 1,600 and 3,200 cps, we hear [e]
between 2,400 and 4,800 cps, we hear [i] lax
between 3,200 and 6,400 cps, we hear [i] tense — Cf. R. RENARD,

the sound spectrum. Each sound has a particular ‘optimal’ frequency (i.e. the frequency band, or combination of frequency bands) at which a native-speaker best recognizes and perceives the sound in question according to their mother tongue. Students who experience difficulty with a particular foreign language sound are considered as not having recognized (i.e. perceive) its optimum. Thus, they are unlikely to be able to reproduce the sound correctly.

If, for example, the sound [i] in French is recorded and listened to successively through octave filters:

According to the Figure 1, the French [i] is made up of all those sounds, each sound occupying a different frequency. Yet when French speakers were asked to identify these sounds, all the sounds were identified by French speakers as productions of the phoneme /i/. This manipulation of the French [i] sound showed very clearly the superabundance of the acoustic reality. Through perception a distinction between what is necessary for [i] to be recognized ([i] is recognized between 3200 Hz to 6400 Hz, previously in cps: cycles per second) and what is superfluous in the plethora of information which comes through the vocalic timbre (the quality of the vowel) was made by French Native Speakers (NSs).

However, when it comes to a L2 learner learning French, the learner would perceive a sound

through hearing all the frequencies that are contained in a sound. As the learner’s perception is likely to be mediated through the pre-established code based on his/her mother tongue, when it comes to perceiving a sound in L2, he/she is likely *not* to recognize the sound /i/ at the frequency recognized by a French person. He/she is likely to recognize the sound /i/ at a frequency dictated by his/her mother tongue such as between 300-600 Hz. Thus, he/she is in danger of confusing /u/ (between 300-600 Hz) with /i/ (between 3200 and 6400 Hz), or with /o/ (between 400 and 800 Hz) as these sounds also occupies part of the spectrum that contains /i/ at different frequencies.

A remedial strategy could be, in order for L2 learners of French to perceive [i], to eliminate all the sounds at frequencies above 300 Hz and only leave frequencies between 3200 and 6400 Hz through a process of *filtering* so that L2 learners can be exposed to the French [i] at the correct frequency. This strategy is not very different from the strategy adopted by McCandliss, Fiez, Protopapas and McClelland (2002) in training Japanese speakers to discriminate between the difference between [r] and [l] in English in which exaggeration was used to highlight the difference.

A similar filtering process was used in the Verbo-tonal method (VTM) of phonetic correction, developed at the Institute of Phonetics of the University of Zagreb by the late Professor Petar

Guberina. This method of corrective phonetics had been used by teams of teachers and researchers to write structuro-global audio-visual courses under the supervision of Professor Guberina and Paul Rivenc in the 1960s (Heras & Regan, 1985; Renard & Vlasselaer, 1976). Filtering in VTM (Renard, 1975) is a load lightening measure through which only the “relevant frequencies” for a particular sound, in this case, that of /i/ in French, is allowed to remain.

Certain practices of SEA owe a great debt to VTM. These practices, derived in some part from VTM, provide an alternative approach to education in Thai tones and prosody through educating students in the performances of phrases in action. VTM does not and cannot offer students the complete mastery of the infinite diversity of the NS speech in any language because many aspects of language and language use of the Thai language or any other language have not been defined and may be not definable. Thus in the case of learning Thai as a foreign language, in this course L2 students were taught sentences which were most relevant to their lives in Thailand in particular ways so as to enable them to develop a ‘feel’ for the language. Students trained with the benefits of VTM might be better prepared to perform a phrase in such a way as to be more readily intelligible to NSs of the TL community.

In studies conducted for the rehabilitation of hard of hearing children and adult, SUVAG II machines (http://www.suvag.com/ang/produits/suvag_2.html) which are capable of transmitting language sounds at various frequencies including low frequencies without distortion (Guberina & Asp, 1981) were used to bypass the mother tongue ‘sieve’. In this particular study, the sentences that are fed through Sptool will have frequencies above 300 Hz removed through electronic filtering. So what is being displayed on the screen is the pitch curve (i.e. tones of Thai in this case) of the sentence to be learned. Though the same filtering technique was used to produce the sentences in the teaching materials, no recording of sentences

at low frequencies was played in the classroom procedure because good quality amplifiers and loudspeakers were not available for this purpose.

Ideally, in order to sensitize student’s perception to the tones of Thai, filtering should have been used to highlight the prosodic elements of the language. Due to the lack of such suitable equipment, instead of filtering, humming was used. The intonation pattern that is obtained through humming is a simulation of the original intonation pattern of the sentence. By humming, the suprasegmental aspect of the utterances is highlighted at the expense of the vowels and consonants. Humming allows students to focus on the suprasegmental aspect of the language. Since humming a sentence is within the capability of any normal hearing person, it is much more practical than the use of filtered sentences through loud speakers. Humming is but one of the procedures for exposing students to the corrective optimals of the Thai language.

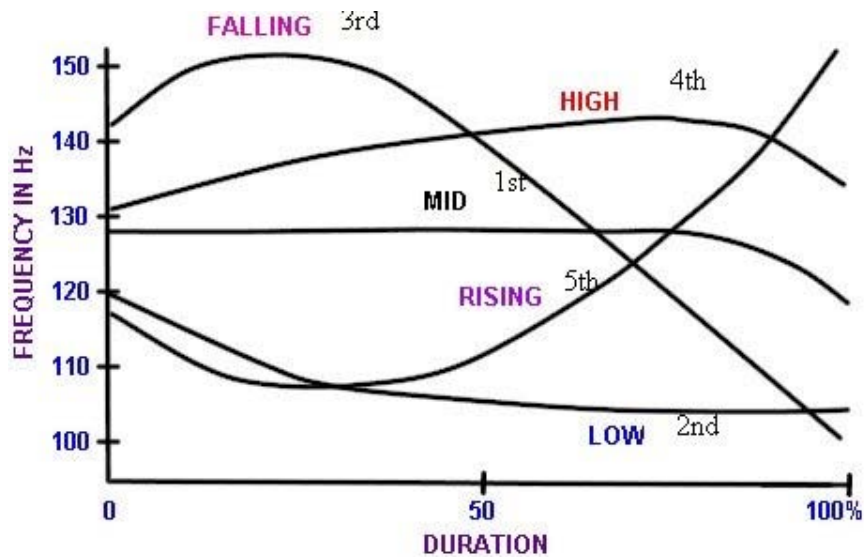
After being exposed to corrective optimals through a number of procedures, it is through intensive articulatory practice that students can access valid acoustic models constituting the normal range for the phonemes of language. This course’s intense language exposure via a variety of computer assisted tools, including the Sptool, plus the intensive articulatory practice carried out in Phase 1: language sensitization process, provide students with such valid acoustic models of the phonemes of the L2.

A NEW METHOD OF TEACHING THAI PRONUNCIATION TO L2 BEGINNING LEARNERS OF THAI

The Thai Tonal System

There are five tones in Thai (Figure 2). There are 5 distinctive tones (pitches) in Standard Thai. They are: (1) mid level tone (here represented with the number 1), for example: *khaa1* (to be

Figure 2. Contour pattern of the 5 Thai tones



lodged in); (2) low level tone (represented with the number 2), for example: *khaa2* (Galanga, an aromatic root); (3) falling tone (represented with the number 3), for example: *khaa3* (I, slave, servant); (4) high level tone (represented with the number 4), for example: *khaa4* (to sell); (5) rising tone (represented with the number 5), for example: *khaa5* (leg). The following chart shows the contour pattern of the 5 tones.

The design of the SEA method has also drawn from research findings on (i) how very young infants use prosodic packaging of clausal units to facilitate their memory for speech information (Hirsh-Pasek et al., 1987; Mandel, Jusczyk, & Kemler Nelson, 1994); (ii) formulaic sequences in foreign language learning improves the fluency of L2 learners' foreign language production (Wood, 2009) (iii) a speaker's natural synchronization of speech and movements (Condon, 1971; Condon & Ogston, 1967); (iv) how rhythmicity is used as source of prediction in caring situations between babies and carers (Maier, 2004) and, (v) therapeutic uses of movements for speech and hearing impaired children (Brüll, 2003; DiJohnson

& Craig, 1971); (vi) Learning through multi-modalities is more effective for pronunciation training than a single modality (Derwing, Munro, & Wiebe, 1998). For a comprehensive literature review, please consult Zhang (2006).

The question might arise as to whether this method is similar to the Total Physical Response (TPR) (Asher, 1977) method developed by Professor James Asher in 1977. SEA is not like TPR because:

1. It does not adopt the strategy of delayed speech in the arrangement of learning activities and materials. In fact, students are required to produce almost immediately.
2. It acknowledges the differences between learning of L1 and the acquisition of a second language in that it promotes the motivational energy engendered by adult students' social needs to communicate.
3. It does not organize teaching materials and activities on some arbitrary principle of difficulty or developmental sequence. The materials were chosen first and foremost according to communicative principles and relevance to the students.

4. Apart from teaching the language, students were also taught a number of processing load lightening skills so that they learnt how to physically, not just mentally, produce the language in its optimal prosodic contexts. The physical gestures for tones also equip them with physical reminders that tone is an indispensable part of Thai pronunciation. In other words, the approach does not work on one isolated aspect or element of Thai. It works simultaneously on segmental, suprasegmental, grammatical and syntactic systems.

5. Most importantly SEA does not use gesture as a mnemonic device for enhancing the acquisition of vocabulary items only. It acts as a reminder of a whole set of known and unknown memory traces. SEA may also use movement and prosody to help students to segment the language stream.

Asher's approach to language learning, however, assumes that listening should be developed before speaking because this is what happens when a child learns his/her L1 and delaying speech seems to reduce stress (Gary, 1975). In adults who are learning Thai as a L2, the proposed constructs of phonological store and articulatory rehearsal (Gathercole & Baddeley, 1993) might already be fully functioning in their L1. Theoretically, even if we want to delay production in L2, the developed coordination in the phonological store and the articulatory rehearsal might not be able to be stopped. Secondly, as language learning theories have convincingly argued, the need to keep the language learning process communicative for social reasons, it is both theoretically unsound and potentially de-motivating if adult learners are prevented from trying out the newly learned language through oral communication.

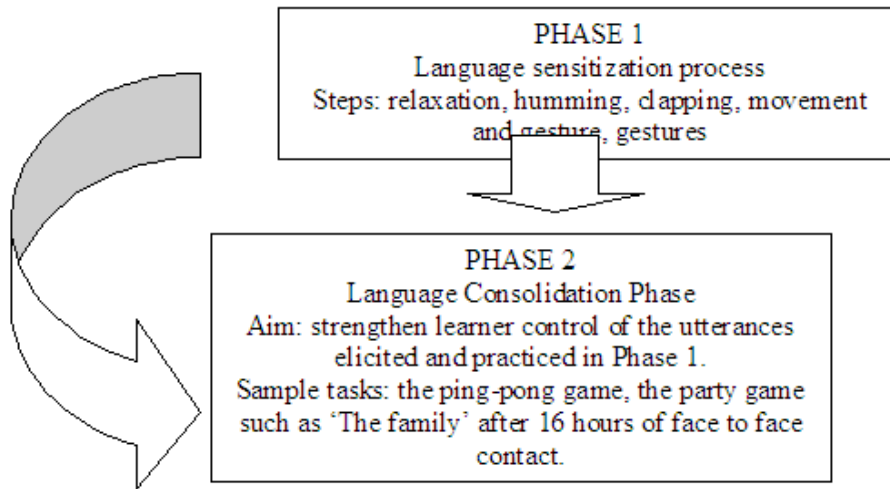
In terms of classroom activities, Richards and Rodgers (1986) stated that the labeling and ordering of classroom activities in TPR seem to build on the structural view of language in that the mastery of a language is through the sequential mastery of phonemes, grammatical units, lexical items and grammatical operations. One key objective of TPR is the use of action-based drills

in the imperative form. It is difficult to see how these commands are linked to the L2 as a whole apart from being an element of it. SEA, on the other hand, does not order classroom activities according to structural views. It is based on the communicative needs of students.

Thai also has a very complicated stress system with the duration of syllables as one of the most prominent features used to distinguish stressed and unstressed syllables in Thai (Hiranburana, 1971, Luangthongkum, 1977). There is also interplay between tone and intonation which results in four intonation contours or Tunes being postulated (Luksaneeyanawin, 1998). A full and comprehensive description of the Thai language might be of interest to phoneticians or linguists. It would be impossible for any language teacher of Thai to explain the complex system of Thai to L2 students. In normal everyday use, utterances in Thai are spoken with all the characteristics of Thai (tones, stress, intonation, rhythm, vowel lengths and so on) combined. Therefore, as we intend to teach our L2 students to be comprehensible to native speakers of Thai in real life, activities should focus on phrases or sentences rather than individual words or lexical tones. This is particularly important when teaching L2 students from other tonal languages such as Mandarin and Vietnamese as the likelihood of Mandarin and Vietnamese tones interfering with the perception and production of Thai tones is great. Furthermore, since lexical tones change their character when in the environment of other words, a mastery of individual lexical tones is no guarantee for success in speaking conversational Thai. Figure 3 is a schematic outline of SEA, showing the two principle phases and their sequencing.

Recent research in neuroscience has also offered evidence that: (i) adult human auditory brainstem is capable of being changed following short-term linguistics training such as tone differentiation (Song, Skoe, Wong, & Kraus, 2008); (ii) English speaking learners with previous musical training could use pitch contrasts to identify

Figure 3. Schematic outline of SEA, showing the two principal phases and their sequencing



words and could understand different speakers speaking the pitch contrasts. However, English speaking learners who do not have previous musical or speech (tone) related training, achieved better pitch contrasts identification if only one speaker is used in speaking the pitch contrasts (Lee, Perrachione, Dees, & Wong, 2007).

These findings from research cited above lend support to a range of instructional strategies involved in the learning sequence of SEA in teaching Thai. For instance, in order to cater for less experience learners, in the teaching of experimental group students, a single native speaker was used to teach the class. The learning sequence of SEA is described in the next section.

Phase 1: The Sensitization Phase

The activities in Phase 1 Language sensitization process were concerned with focusing on the rhythm and intonation of the language not on lexical tones. All linguistic items were presented in their situational contexts so that students were engaged in meaningful and useful language practice. The smallest unit of the language being

presented is a sentence rather than individual words or compound words.

The first step in the sensitization session is to ask students to lie on their backs on the floor and if possible, with the classroom darkened, then carry out mind-calming exercises for some five to ten minutes. This allows them to be more relaxed and more receptive to the language input. The teacher first gives this instruction to the class:

“Now, leave your seat and lie comfortably on the floor and listen”. Then the following audio file is played or read out in English:

Imagine that you are lying on your back on the grass on a warm summer day, and that you are watching the clear blue sky without a single cloud in it (pause). You are lying very comfortably, you are very relaxed and happy (pause). You are simply enjoying the experience of watching the clear, beautiful blue sky (pause). As you are lying there, completely relaxed, enjoying yourself (pause), far off on the horizon you notice a tiny white cloud (pause). You are fascinated by the simple beauty of the small white cloud against the clear blue sky (pause). The little white cloud starts to move slowly toward you (pause). You are lying there,

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completely relaxed, very much at peace with yourself, watching the little white cloud drift slowly toward you (pause). The little white cloud drifts slowly toward you (pause). You are enjoying the beauty of the clear blue sky and the little white cloud (pause). Finally the little white cloud comes to a stop overhead (pause). Completely relaxed, you are enjoying this beautiful scene (pause). You are very relaxed, very much at peace with yourself, and simply enjoying the beauty of the little white cloud in the blue sky (pause). Now become the little white cloud. Project yourself into it (pause). You are the little white cloud, completely diffused, puffy, relaxed, very much at peace with yourself (pause). Now you are completely relaxed, your mind is completely calm (pause), you are pleasantly relaxed, ready to proceed with the lesson (pause) (Bancroft, 1978, p. 178).

This constitutes the relaxation phase of the classroom procedure. As Lian noted (Lian, 1980):

Relaxation of the body will bring about a lowering of conscious and unconscious resistance to the learning of a FL. Speech and the production of sounds appear to be the result of the muscular behaviour of the body as a whole which, with appropriate reinforcement, has given rise to a number of set patterns of muscular contractions. If these still operate when one attempts to learn the articulatory patterns of a FL, then the resulting articulatory sequences will be deformed, sometimes beyond recognition.

It becomes very important to reduce the influence of the set of individual muscular tensions and movement to a minimum when learning Thai. Relaxation techniques appear to be an effective way of reducing, if not eliminating, such conditioning so that it can be replaced with another set of muscular tensions and movements: those of Thai. For this reason, the relaxation phase of the course is extremely important. Relaxation is therefore the first step recommended for the teaching of Thai.

Step 2: Students and the teacher walk around in circles and hum along to the rhythm of the sentences without vowels and consonants (5 times). This is used to highlight the intonation and rhythm of Thai. It is imperative that in this step, the teacher does not start by modeling or reciting the target sentence with consonants and vowels intact as any such modeling defeats the purpose of focusing on the melody of the sentence without the interference of consonants and vowels.

As the input and output of the language uttered mutually reinforce each other, three factors must be considered in order to maximize the benefit of production and perception. First, such a structure should be relatively easy to produce a maximum of 5 to 7 syllables. Second, humming allows L2 students develop a much better perception of the melodic patterns concerned. This delayed exposure to consonants and vowels shifts students' attention to other often neglected aspects of the language such as rhythm and intonation. It is also to encourage the creation of mystery so that students' curiosity is aroused.

Step 3: The teacher claps to the rhythm and the beat of the language and then ask students to follow. The students, while listening to and "feeling" the intonation patterns, begin to move in harmony with the rhythm and intonation of the sentences modeled by the teacher. The teacher provides the beat and the rhythm of the sentences according to the stress and discourse features of the sentences. The clapping to the intonation patterns created a rhythm that students could follow while walking in a circle. This allows students to experience the rhythm of the sentence and observe different groupings of the words in a sentence. This also enables them to observe the key words in a sentence and realize that not all words are of equal value and that in making oneself understood, one needs to get the key words right to be understood.

Step 4: The teacher walk about with feet coming down on every syllable, to get the body used to producing a tone such as the tense downward tone that is also loud (the falling tone) (3rd tone).

The teacher also raises or stretches upwards as though attempting to touch the ceiling. This allows students to experience the tenseness of the body in producing the rising tone (5th tone). Students are then instructed to perform the same gestures. Students are also instructed to adopt a forward lumping of the shoulders for 1st and 2nd tones in Thai as the production of these tones need a relaxed posture. When the teacher detects that after the humming and clapping, students still fail to perceive the rhythm and melody of the sentences correctly, gesturing provides students further ways of manipulating the body tension to achieve certain rhythmic structures.

Step 5: Mouthing the words: In this step, the teacher instructs students by saying “Continuing with the movements, now mouth the sentences while I say them out loud” (Step 5). For the first time in the learning sequence, so far, students are hearing an intelligible sentence. They are asked not to say anything but merely to mouth the words. Mouthing the words gives students the opportunity to practice the articulation of the sounds of the words without, in fact, placing them on an intonational background actually produced themselves. This technique should lead to a reduction in the number of articulation errors.

Step 6-7: Adding words to the intonation patterns: The teacher then says “Now repeat after me, and then add words to the intonation.” This again is done for five times (Step 6). The teacher then instructs everybody to repeat the sentence in chorus while constantly checking that each student is reproducing the sentence correctly (Step 7).

Steps 2-5 isolate each element of articulation e.g. humming, clapping, gesturing and mouthing before restoring them to a normal context in steps 6-7. This procedure has the further advantage of eliminating as many difficulties as possible in terms of comprehension of the sentence. Consequently, by the time students are actually asked to repeat a full sentence, they will have practiced each of its constituent elements many times. They will look forward to achieving success in the next

step of the process which should present little additional difficulty.




Repetition first takes the forms of chorus work and then individual repetition. Chorus work provides an environment where anxiety about speaking an L2 could be reduced to a minimum. Although carrying out chorus work in class is “safe”, it is hardly ever likely to be encountered in real life. It is important, that students also be conditioned to speak with self-assurance in the normal communication situation. To this end, at the appropriate juncture such as at the end of a conversation, a ping pong game could be played with the newly acquired TL. For instance, after practicing the following conversation:

Conversation 1 (บทสนทนา ที่ ๑) (Table 1)

in the ping pong game, a ball made out of a piece of used paper, is thrown around the group while the group is still in a circular formation. The person holding the ping pong ball plays the role of Person A. He/she then throws the ball to another student who plays the role of B after saying, for example, *สวัสดีค่ะ ดิฉันชื่อสุภา คุณชื่ออะไรคะ* (Hello, my name is Supha. What is your name?) When B catches the ball, he/she needs to answer the question asked with the appropriate answer. In this case, *สวัสดีครับ ผมชื่อศักดิ์ดา ยินดีที่ได้รู้จักครับ* (Hello, my name is Sakda. It's very nice to meet you). B throws the ball to another student by assuming the role of Person A and asks the question *สวัสดีค่ะ ดิฉันชื่อสุภา คุณชื่ออะไรคะ* (Hello, my name is Supha. What is your name?). This goes on until all members of the class have been involved in the conversation. This game should be played after learning every two sentences in the above conversation.

Experience testifies that as the students' confidence grow, so will their willingness to participate in this activity (Lian, 1980; Zhang, 2006). Though the group situation could not be totally under a student's control, to some extent, it is possible

Table 1. Greetings for people who first meet

	สุภา:	สวัสดีค่ะ ดิฉันชื่อสุภา คุณชื่ออะไรคะ Hello, my name is Supha What is your name?
	ศักดา:	สวัสดีครับ ผมชื่อศักดา ยินดีที่ได้รู้จักครับ Hello, my name is Sakda. It's very nice to meet you.
	สุภา:	ยินดีที่ได้รู้จักเช่นกันค่ะ It's also very nice to meet you.

for students to work at their own pace within the group situation because each time they listen and observe another student's production of the utterance, their own learning is being reinforced. Through the ping pong game, students get the opportunities to listen to his/her classmates using the learned sentences to communicate thus revising the newly learned language in his/her own head. The randomness of the game also creates a bit of tension which encourages the students to rehearse the language silently while observing other students' performances. For the teacher, if a common error occurs, this game gives her/him an opportunity to correct the error using gestures and rhythm.

Repetition exercises such as this provide reinforcement at both the perceptual and articulatory levels. By the time the students complete an "average" sensitization session, they would have repeated or been exposed to the same pattern or a set of closely related patterns in their situated context about 35-40 times. Such a high number of repetitions are, of course, a great reinforcer of perceptual and articulatory skills.

Throughout the learning sequence, translation and writing down the sentences are not needed until the last moment. By the time students come to write down the meaning, they will have already internalized and memorized the melody of the sentences. The activities in the sensitization phase offer students a range of physical ways for remembering the Thai sentences learned beyond the set contact hours each week. These measures set up a series of learning steps and establish a

common metalanguage between students and the teacher that can be used for self-monitoring in self-access learning at home.

Phase 2: The Language Consolidation Phase

After four weeks, students would have covered all the language required to discuss their own family. It is at this juncture that a genuinely communicative activity is introduced in order to further consolidate the language learned. This communicative game is called a family tree game. According to Gatbonton and Segalowitz (2005) 'an activity is genuinely communicative if it involves at least two participants working together to complete a task by exchanging information possessed by one and not the other' (p. 331). Two requirements for genuineness of communication are implied in this definition. First, new information must pass from one interlocutor to the other (an 'info gap' is filled), and the solicited information must be crucial for the continuation of the assigned task (the information sought and passed on must genuinely be needed for later communication).

In the 'Family' game, first the students are asked to write a piece of paper that contain information about their immediate family in the first week by answering questions like 'How many members are in your family?', 'How many brothers and sisters do you have?', 'Who are they?', 'How old are they?' and 'What are their names?'. Then the teacher creates a 'Find someone who' sheet using the information from the students in

the class. Information on the ‘Find someone who’ sheet could be ‘Find fellow student(s) who have two younger brothers and one younger brother.’ Then in the fourth week, each students will be given a ‘Find someone who’ sheet which contains information about the 22 students and an individual character sheet which contains only information for that particular character. Each student’s job is to ask these target questions: ‘How many members are in your family?’, ‘How many brothers and sisters do you have?’, ‘Who are they?’, ‘How old are they?’ and ‘What are their names?’, in order to find all the students listed on the ‘Find someone who’ sheet. Students are instructed not to stop until all students have been found. In the completion of this game, students have to move around the class posing the required questions thus practicing the same set of questions over and over again.

Like the steps in the ‘Sensitization phase’, the activities in the ‘Language consolidation phase’ are inherently repetitive. After completing this game as a spoken activity, students are instructed to work in pairs to construct a family tree by asking each other the same set of questions. Here, too, repetition is necessary to gather the information needed to complete the task. From a psychological perspective, because of the high consistency of situation-utterance correspondences across the repeated events, this repetition will lead to automaticity in both reception and production (Schneider & Chein, 2003 cited in Gatbonton, Segalowitz (2005)).


Content of Teaching

In this course, because all students were zero beginners of Thai, the language input chosen was phrases and sentences involved in common pragmatic situations such as introduction, talking about one’s family and so on. The smallest unit was a sentence rather than a word or phoneme though a vocabulary list was also provided. The following is an example of the teaching material used in the course. Notice each sentence and vocabulary is attached to its own sound file. When clicked, the sound file is retrieved by Sptool and opens up in a different window in which the pitch curve of the sentence is shown. The course data CD-ROM also contains teaching materials in html format; all associated sound files and the speech tool (Sptool). An audio CD-ROM of the sound files is also provided with the course materials.

Conversation 1 (บทสนทนาที่ ๑) is shown in (Table 2), and Conversation 1 Vocabulary (คำศัพท์ในบทสนทนาที่ ๑) is shown in (Table 3).

In SEA, the goal of teaching is to help students learn to use whole utterances flawlessly, effortlessly and appropriately. To achieve this aim, an environment with a low affective filter needs to be created. Similarly, due to the tonal nature of the Thai language, it is especially important to sensitise L2 learners to the tonal nature of Thai particularly for L2 students who come from other tonal language cultures because of the necessity to lessen the impact of tones in L2 students’ mother tongue. For these reasons, utterances are taught kinaesthetically, visually and physically to

Table 2. Greetings for people who first meet

 <p>สุภา: ศักดิ์ดา: สุภา:</p>	<p>สวัสดีค่ะ ดิฉันชื่อสุภา คุณชื่ออะไรคะ Hello, my name is Supha What is your name? สวัสดีครับ ผมชื่อศักดิ์ดา ยินดีที่ได้รู้จักครับ Hello, my name is Sakda. It’s very nice to meet you. ยินดีที่ได้รู้จักเช่นกันค่ะ It’s also very nice to meet you.</p>
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highlight the tonal nature of Thai language. Through these steps students learn to see, move and feel the language. Analysis of these constructions is intended only to facilitate automatizing the whole utterance.

Given the complexity of the various processes involved in perception and phonation, learning processes in this domain is most likely to be operating at the unconscious level. An intellectualization of these processes, such as comparing the phonetic systems of Thai and Chinese and English is likely to interfere with students' perception as it activates the 'mother-tongue sieve' in the task

of learning Thai and thus interferes with learners' perception of Thai sounds and prosody. In SEA, the traditional cognitive load lightening measure such as translation into Chinese or English, or writing in the standardized romanization system of Thai with tone diacritics were deliberately and intentionally not used at all in teaching Thai in the study under discussion. Similarly, in the teaching of English to speakers of other languages, Fraser (2001) also advocates not using IPA symbols with beginners because "it can detract from the real issue, which is pronunciation, and because the

Table 3.

สวัสดี	 Hello or goodbye
คะ	 Polite particle for females
ดิฉัน	 I, me (female speaker)
ชื่อ	 Name
คุณ	 You, a second person pronoun used as a polite way to call others, normally precedes the name of a person
อะไร	 What?
คะ	 Polite particle used by female speaker at the end of a question
ครับ	 Polite Particle for male speaker, used at the end of the sentence and as "yes"
ผม	 I, me (male speaker)
ยินดีที่ได้รู้จัก	 Nice to meet you.
ยินดีที่ได้รู้จักเช่นกัน	 Nice to meet you too.

concept of ‘phoneme’ is quite an advanced one for many ESL learners).”

Through every aspect of this approach, it was thus intended that the language learned is constantly associated with a stimulating and pleasurable emotional environment. Such environment ensured that what was learned becomes deeply embedded. Through these steps, by observing the teacher’s native speaker (NS) behaviour, and by perceiving the differences between their own and the teacher’s behaviour in producing Thai, learners were able to respond to teacher feedback readily. These pedagogic measures also were designed to instill in students certain memory traces by physically ‘marking’ on their brains so that these memory traces could be reactivated once feedback either from the Sptool or from any other sources has been received. These memory traces were essential in enabling students to automatize sentences learned and act upon the feedback received.

The experience of teaching Mandarin testifies that students became more sensitive to the importance of grammar after they successfully completed the audition process (Zhang, 2006). Having automatic access to the formulaic constructions made the students more receptive to the grammar learned. Furthermore, in a Mandarin classroom in which the L2 learners were all English speakers from Australia who had virtually no grammatical knowledge of English, too much grammar in such a course would have added cognitive load on the students (Zhang, 2006). This was the reason why grammar explanation was hardly used in this study.

Role of the Teacher

In SEA, the teacher plays the role of what Morley (1991) describes as one of ‘speech coach or pronunciation coach’ (p.507). Instead of just correcting L2 learners’ mistakes, the ‘speech coach’ ‘supplies information, gives models from time to time, offers cues, suggestions and constructive feedback about performance, sets high standards,

provides a wide variety of practice opportunities, and overall supports and encourages the learner’ (Morley, 1991, p. 507).

In SEA, for the best possible results, a teacher should supervise at least the sensitization session. It is in this session that he/she would ensure that the prosodic structures have been perceived correctly. If incorrect perception of the prosodic structures has been detected, he/she should take immediate corrective action. Moreover, he/she should also ensure that students are developing the necessary “*feel*” for the language and self-synchrony (refer to Step 4: Incorporation of movement and gesture).

It is essential that the teacher should constantly monitor all the students’ performances. It has been argued that a teacher working under such conditions would be incapable of picking out the errors committed by students, because he/she cannot listen to all of them individually. Experience in this course indicates that in the majority of cases only one or two persons in a group would be significantly “out of tune” with the rest of the group. Such persons are easily identified and corrected immediately. In this way, students would not spend a considerable time reinforcing their errors during “private” repetitions as they would likely do in a language laboratory. The teacher is also in a position to determine whether generalized errors are occurring and to correct them in a variety of ways e.g. by exaggerating the model sentences at the point of difficulty or by using corrective gestures.

In order to reduce the gap between real communication and exercises of this nature, the teacher should attempt to establish the kind of situations in which the sentences might be uttered e.g. asking students to maintain eye contact (rather than closing one’s eyes in an attempt to recall words) when speaking to each other. He/she should also remind students of the importance of gesture in the communicative act and should demonstrate this by taking part in the activities of the group.

The teaching techniques described in Steps 1-8 teach more than the few phrases chosen each week. In teaching the rhythm, and the eurhythmic gestures, we are also imparting onto the students how Thai speakers synchronize with each other in speech, in proximity and in body language. In the course under study, students were strongly encouraged to form conversation exchange groups with NSs in the community so that they could put into practice the prosodic patterns they had been learning. This was the privileged place for the actualization of prosodic patterns and for hypothesis testing with real NSs of the TL accompanied with the realities of communication.

Teaching Learners How to Learn

The weekly routines in the sensitization and consolidation phases of SEA also establish a shared meta-language between the teacher and the students. He/she should also inform students that though the teaching method is fun, they would still be required to do a significant amount of work. This meta-language is the result of the teacher's implies that the teacher should, ideally, possess some knowledge of articulatory phonetics and kinesics and his/her ability to diagnose errors in tones, intonation and in synchrony. In the case of Thai, language correction should move away from the traditional verbal correction such as "no, it's a third tone, not a first tone" to include provision of feedback through movement and gesture in the appropriate prosodic contexts. Last but not least, the teacher needs to develop the ability to sit back and encourage students to produce the language, i.e. increasing student talk rather than teacher talk.

In summary, the relaxation exercise, humming, body movement and gestures, mouthing the words and then repetition offer students a range of physical ways for recalling and correct their own tones. These measures set up multiple corrective feedback mechanisms that can be used for self-access learning at home.

The Role of the Speech Processing Tool and Course Data CD-ROM

Developing a feel for the TL, no matter how well designed the learning environment is, takes time. While student can get feedback from their language teachers during class, in private study this kind of on the spot feedback is usually absent. In this course, students in the EG were learning Thai in Thailand (a second language rather than a foreign language situation) thus their opportunities to test their Thai and to get feedback from Thai native speakers increased. However, in order to reduce L2 students of Thai's anxiety when trying out the Thai language they learned on their Thai native speaking friends, an audiovisual feedback tool (Sptool) was provided to allow the comparison of a student's Thai language production with that of a native speaker's Thai language.

There are already many Computer Assisted Pronunciation Technology (CAPT) systems in the market place which provide instantaneous feedback in the form of spectrograms and waveforms. However, according to Neri, Cucchiarini and Strik (2002), two main reasons make these CAPT systems ineffective. First of all, the simultaneous display of the incoming learner's utterance and the model utterance wrongly suggests that the student should ultimately aim at producing an utterance whose acoustic representation closely corresponds to that of the model. In fact, even though two utterances have very different waveforms, they may both be very well pronounced according to a native speaker. Secondly, these kinds of displays are not easily interpreted by students, because they provide too much information on the student speech's amplitude, pitch, duration which inhibits the learners from being able to pick up the most salient aspects of the acoustic signal. Furthermore, CAPT systems such as Praat (Boersma & Weenink, 2003) are too specialized for student use, if they are not highly computer literate.

Bearing in mind that the feedback provided has to be interpretable and easy-to-use for students,

the design of the Sptool is to measure the pitch curves of sentences of languages only. This means the Sptool is capable of showing the pitch curves as well as length and loudness (correlates of Thai) of utterances in Thai speech through the display of the height and length of the words within utterances. The height and length of the curves also correspond to the articulatory gestures needed to produce rhythmic structure of sentences used in the sensitization phase. Combined with the articulatory gestures it is hypothesized that this will make the feedback long lasting.

In this study, all the written teaching materials on the data CD-ROM were linked to sound files and passed through the Sptool. Once passed through the Sptool, the learner could listen to the teacher's model pronunciation by clicking on the 'teacher' icon. With one click, he/she could hear the model sentence and see the pitch curve of the model sentence displayed on the screen. If the learner wanted to hear a smaller chunk of the sentence, then he/she could select the bit of the curve by dragging the cursor over the portion he/she wanted to hear. After listening to the sentence numerous times, the learner could decide whether he/she wanted to record his/her own production.

Some of the activities in the lecture sequence could be duplicated in different forms through the use of the Sptool. While the classroom sequence was more or less teacher driven and physical, the Sptool allowed the lecture sequence to be experienced differently.

In the following sample sentence from Figure 4, 'di1chan4 chUU3...' (I am)

'di1 chan4 chUU3...?' is a key string of words and the curve clearly shows that the 'chUU3' is clearly longer than the rest. This information was extremely important when training students to accept that the ultimate aim of producing an utterance which was acceptable by native speakers was NOT to produce an utterance whose acoustic representation was an exact match or even closely corresponds to that of the model. It was vital to impress upon the students that the impor-

tance in producing a comprehensible sentence in Thai is to be able to produce the key parts of the utterance correctly.

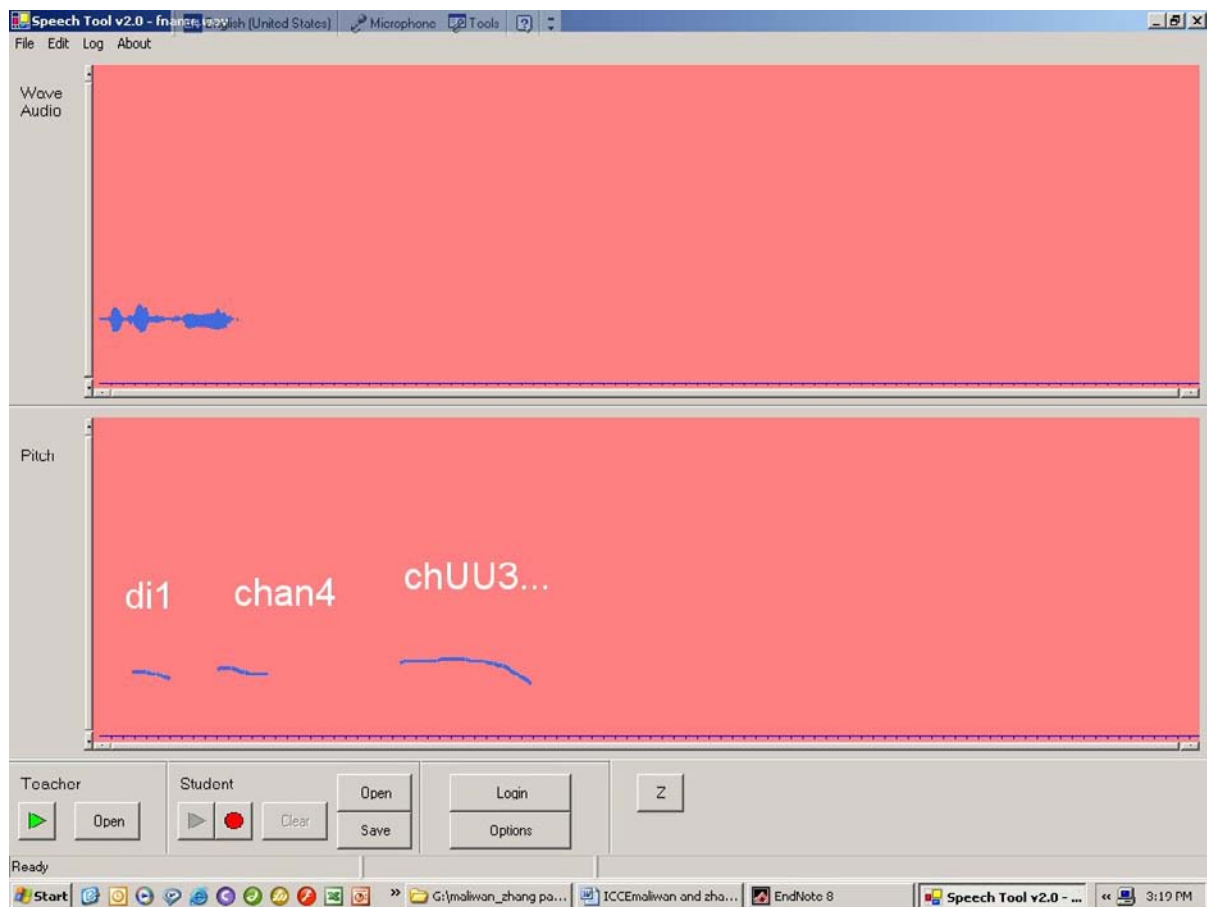
The use of the Sptool encourages students to reflect on and explore in the process of learning. Furthermore, being able to experience each sentence repeatedly through the Sptool creates an environment in which students can totally immerse themselves consciously and unconsciously in the language. As the Sptool was used to interpret the sound files on the CD-ROM, students would encounter a variety of language which was necessary for learners to continue to learn and improve (Egbert, Chao, & Hanson-Smith, 1999). The pitch curves on Sptool also allowed students' output to be compared to the original input thus affording instant feedback. This reduced L2 students' anxiety in speaking the target language (TL). The similarity of the native speaker and the L2 student's pitch curves also served as goals for intelligibility and accuracy thus allowing L2 students to judge whether they made progress. This ability to test their own hypotheses about L2 sounds was also conducive to the development of self awareness in learners. As the practice activities were all situated in personalized and real life contexts, tasks that learners were asked to complete were authentic thus enabling L2 learners to practice interacting with an authentic audience in the safety of their own home (Egbert, Chao, & Hanson-Smith, 1999) (Egbert et al., 1999). Furthermore, because L2 students had been taught how to use their body to experience the language, their body acted as another source of feedback thus giving learners learning autonomy (Egbert et al., 1999).

THE STUDY

Subjects in the Study

There were two groups of students in the study: an experimental group (EG) and a control group (CG). EG consisted of 24(12 pairs) international

Figure 4. Picture of the Sptool showing the sample sentence: *I am (di1 chan4 chUU3...?)*



students who enrolled in the Thai Language for Foreigners course at KhonKaen University, Thailand. They had four hours of face to face contact per week over six weeks (a total of 24 hours). They were taught by SEA for 32 hours and used data and audio CD-ROMs which included a speech processing tool (Sptool). The students in CG were 22 (11 pairs) Chinese students who studied Thai language at Guangxi University for Nationalities, China. These students in CG speak Mandarin Chinese as their first language. The CG students were taught by a Thai teacher using traditional method with the same textbook and did not have any ICT support. However they studied Thai for 44 hours over 11 weeks with 4 face to face contact hours per week.

By the end of the experiment, data from EG was compared with data from CG using the same oral and written testing mechanisms. A set up using Sony microphone plugged into a Dell laptop computer using Cooledit 2000 (Syntrillium, 2002) was used to make the recording. In the next section, the results the project will be reported.

RESULTS

Research Questions

1. “What are the effects of SEA on L2 student oral performances in learning Thai as a foreign/second language?”

2. How did the students in the experimental group use Sptool to aid their learning of Thai?

Method

The effects of SEA on L2 student oral performances were measured by comparing CG and EG's end of course oral performance data, in terms of the quantity and quality of the Thai language produced. Sound files from both CG and EG were also subjected to independent marking by 12 Thai native speaker markers from the Faculty of Humanities and Social Sciences, KhonKaen University. The researchers were not among the native speaking markers. This was called the 'perceptual test'. All markers participated in the current perceptual test on a voluntary basis. Materials marked were spoken conversations from both the CG and EG (11 and 12 pairs respectively) of students. The markers did not know which group each student belonged to at the time of marking. The number of samples marked was 23.

Statistical analyses were performed using the Analysis Toolpak in the Excel package and SPSS statistical package. The critical significance level was set at $p < 0.05$ throughout the study. All oral production data from the 23 pairs of subjects (both CG and EG) were analysed. A 2 tail T-Test for two samples of unequal variance were used to analyse the various characteristics of the conversations spoken by all the subjects involved in this study.

To triangulate the results from oral performances and the perceptual test, an open-ended questionnaire was also distributed to students to gauge their patterns of use of Sptool. Students in EG were also asked to keep a diary on the use of Sptool throughout the learning period.

Results of the Perceptual Test

Results of this perceptual test (seen in Figure 5) by native speakers confirm that the students taught by SEA from EG performed better than the students

in CG who were not taught by SEA. Students in EG achieved an average rating of 21.79 out of 25 with a standard deviation of 1.6 compared to the CG's average rating of 20.95 out of 25 with a standard deviation of 1.13. The difference in the means of the perceptual rating scores given by the markers was statistically significant at $p < 0.05$ level ($p = 0.03$). This means EG students performed significantly better than the students in CG. Furthermore, the level of agreement reached by the 12 native speakers was very high as indicated by an inter-rater reliability score of 0.903 (Cronbach alpha).

Quality of the Conversations

The quality of the conversations produced by both groups was also measured by the average number of words produced per person (shown in Figure 6). In the CG ($n = 22$), students produced an average of 67 words with per person whereas students' in EG ($n = 24$) produced an average of 158 words per person.

However, students in CG produced many more fillers such as 'ums' and 'ahs' than students in EG. On average, students in CG produced 93 fillers and students in EG produced 48 fillers. The positions of the fillers are also interesting. The fillers were analysed according to the position of their occurrences. Fillers could occur in the following ten positions:

- 1 = between subject and verb
- 2 = at the end of a sentence
- 3 = between noun and an adjective
- 4 = between verb and object
- 5 = before prepositional phrase
- 6 = at the beginning of a sentence
- 7 = between verb and adverb
- 8 = before conjunction
- 9 = at the beginning of a phrase
- 10 = at the beginning of words (between words)

Figure 5. Ratings of student oral performances in CG and EG by independent raters in 2010

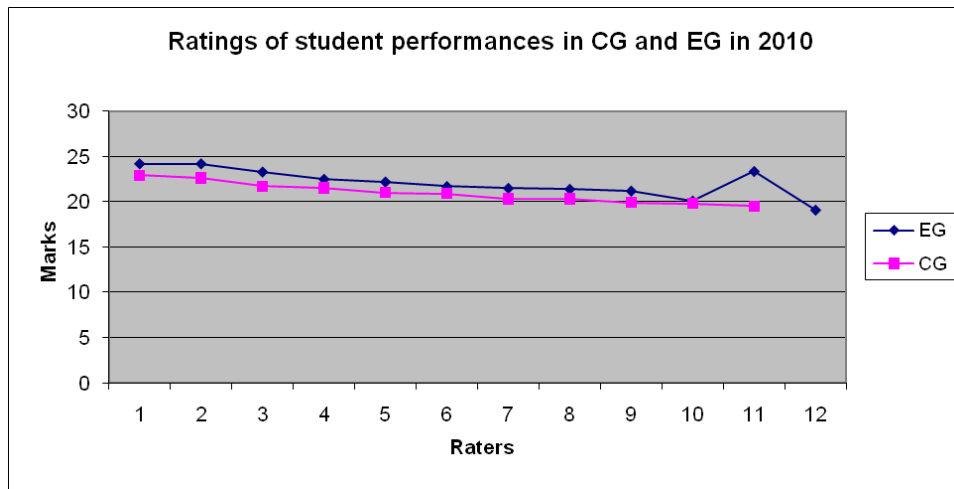
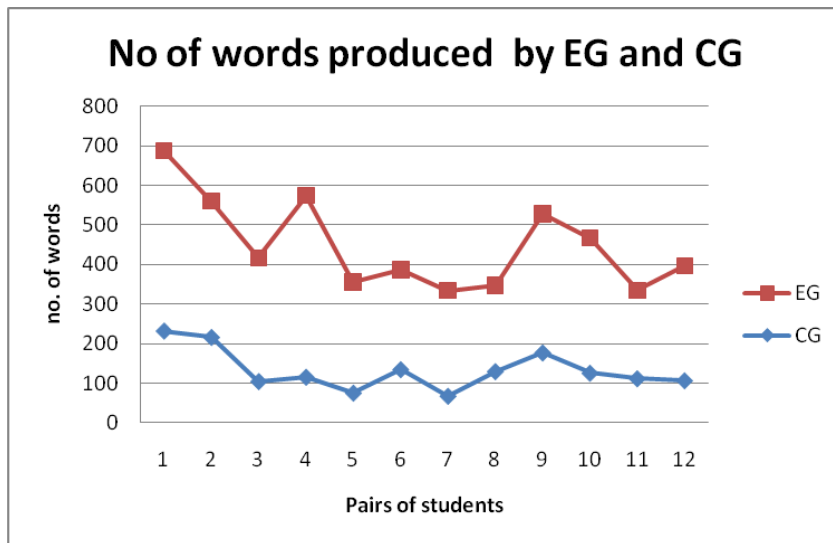


Figure 6. Number of words produced by students in CG and EG



It can be seen that students in CG used many fillers in positions 6, 9 and 10 in their conversations (see Table 4) whereas students in EG used far fewer fillers and used fillers mainly at the beginning of a sentence (position 6) or phrase (position 9) but none at position 10 (see Table 5). Some fillers were also used in between the subjects and the verbs by students in EG. In the data collected from CG, students used a lot of laughter as fillers too.

In fluency research, speed and effortless seem to be the two main characteristics of a fluent performance (Chambers, 1997). Of course because the students tested in this project are only beginning students, the definition of fluency, is defined as ‘The maximally effective operation of the language system so far acquired by the students (Brumfit, 1984, p. 57).

The results in Table 5 suggest that students in the EG had better recall of vocabulary and phrases,

Table 4. Distribution of fillers in ten different positions produced by the 12 pairs of students in CG

Positions	1	2	3	4	5	6	7	8	9	10	lol	Total words
Total no. of fillers in different positions	1	2	0	0	2	47	0	1	24	17	15	1600
Average no. of fillers	0.042	0.083	0	0	0.083	1.96	0	0.042	1	0.708	0.625	67 pp
Key: lol: laughing Pos.= position number 1 = between subject and verb 2 = at the end of a sentence 3 = between noun and an adjective 4 = between verb and object 5 = before prepositional phrase 6 = at the beginning of a sentence 7 = between verb and adverb 8 = before conjunction 9 = at the beginning of a phrase 10 = at the beginning of words (between words)												

Table 5. Distribution of fillers in different positions produced by the 12 pairs of students in EG

Positions	1	2	3	4	5	6	7	8	9	10	lol	Total words
Total no. of fillers in different positions	5	1	0	1	0	29	0	1	11	0	3	3790
average	0.21	0.042		0.042	0	1.21	0	0.042	0.46	0	0.125	158 pp
Key: 1 = between subject and verb 2 = at the end of a sentence 3 = between noun and an adjective 4 = between verb and object 5 = before prepositional phrase 6 = at the beginning of a sentence 7 = between verb and adverb 8 = before conjunction 9 = at the beginning of a phrase 10 = at the beginning of words (between words)												

i.e. more fluent, as demonstrated by making no fillers within words (at position 10), less use of fillers in position 6, 9 (almost half as many fillers in total) and producing almost twice as many words in total.

Qualitative Data

At the end of the course, students taught with SEA, were asked to fill in an open-ended questionnaire

to gauge their attitudes towards the use of Sptool and the CD-Rom. From 20 questionnaires collected at the end of the semester, 17 students felt that Sptool was useful in their learning and most of them used the computer materials and Sptool for at least 7.5 hours per week per person. This is a significant amount of time spent on the task of learning Thai especially when compared to other similar courses which used SEA to teach

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foreign languages (maximum 3 hours per week per person) (Zhang, 2006).

As one student wrote in the open-ended questionnaire:

Learning the language is difficult. But with the help from teachers and the CD, we could learn something that we have not been thinking of. Sptool and the files on CD helped a lot. I would definitely say that it [Sptool] is very useful because it checks out pitch and tone when I speak the language. I would like to say Sptool can be used to learn other languages as it monitors and tracks your pitch.

Throughout the course, participating students in EG were also asked to keep diaries on the using of Sptool for learning Thai in English (their second language). Students were overwhelmingly positive towards Sptool. While some students persisted with Sptool, some found it too difficult to use and preferred to learn from their Thai friends. Most treated Sptool as a teacher and also checked their pronunciation with their Thai friends.

One student also used humming (which was demonstrated during the sensitization phase) in her private study:

I think num-sa-korn is hard, so I use Sptool to listen to the pronunciation more than 3 times and watch the tone, then I use the way of humming (sic) to practice the tone and practice to pronounce..... I record my pronunciation and compare, it's similar. So I read 2 times for remember the word.

For long words, this student also invented her own strategy:

The reason that I can't remember those words is they are too long, and they are difficult to pronounce. So I use Sptool to separate every word's tone, and pronounce part by part, and then make up them. At the beginning, my pronunciation is too strong in the end of every part, so when I make up

a word, it sounds like strange, so I use humming (sic) to practice. Finally, I got it....it's close to original one around 80%.

It can be seen from the diary entry quoted above that for this student, Sptool was playing a role of the teacher in her private study because instead of trying to remember how a phrase was pronounced in the sensitization phase, she checked the phrase using Sptool first, then practiced how to use her body to hum the phrase, practice it, then check against Sptool. Only when the pitch curves were similar, she tried to memorise the word. In other words, in her private study, she managed to transfer the strategies she was taught in the face-to-face session to her private study. Similarly, the second quote demonstrated how she broke a phrase up into its constituent parts tone by tone and then restored all the parts into back into the target phrase. This technique was demonstrated and practiced weekly in the sensitization phase thus enabling this student to adopt the same strategy in her own learning.

Some EG students' diary entries, however, seemed to suggest that L2 students needed to be trained longer in using Sptool. This was particularly evident from male students' diary entries. As the sample sentences were recorded using a female voice, when recording and comparing students' voices, male students needed to remember to indicate that their gender is male. As there is a difference of about 100 Hz between the male and female voices, choosing the wrong gender would have resulted in difficulty in interpreting the pitch curves. This could have been one of the reasons why some male students found the pitch curves on Sptool hard to use.

SUMMARY AND CONCLUSION

This chapter outlined a number of benefits for students related to the general use of technology in the multi-sensory learning environment known as

SEA. Students in the experimental group appeared to gain more confidence in directing their own learning through using Sptool as well as transferring skills learned in the classroom into everyday communication. From a theoretical point of view, the design of SEA directly promotes fluency by initiating and sustaining automatization in a manner compatible with a communicative approach to language teaching. The effectiveness of the SEA environment has been demonstrated by L2 students' superior ability to speak Thai after just 24 hours of face-to-face contact. Indeed, the tasks of learning were made easier by the inclusion of 'low tech' technologies such as the CD-ROM and Sptool. The frequency of interaction and ease of access afforded by the CD-ROM and Sptool had been extremely motivating as on the spot feedback was always available during the beginning stage of learning especially in private study.

One limitation of the study was that it was not possible to closely match the control group with the experimental group as strictly speaking students in the control group studies Thai in a learning Thai as a foreign language context (i.e. in the People's Republic of China) and the students in the experimental group were beginners studying Thai in a second language environment (i.e. in Thailand) even though they were also beginning students of Thai. Though this makes it hard to attribute the learning gains to the environment alone, results obtained here concurred with previous application of the SEA environment in Vietnam with Vietnamese students (Buranapatana, 2007).

The results of this study show that the learning environment known as SEA offered students more than multiple sources of feedback. Most important of all, this environment is a demonstration of how a pronunciation program which involves the learner's intellectual, affective and physical involvement (Morley, 1991, p. 507) can be created and realized.

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KEY TERMS AND DEFINITIONS

Formulaic Language: In this chapter, recurring multiword chunks in the speech of native speakers in particular contexts are defined as formulaic utterances.

Segmental: describes the discrete elements of sequential speech, as consonants and vowels.

Suprasegmental: Some phonemes cannot be easily analyzed as distinct segments, but rather belong to a syllable or even word. Such “suprasegmentals” include tone, stress, and prosody.

SUVAG II: The SUVAG II is an auditory training unit for the rehabilitation of hard of hearing subjects and of those with small hearing impairment. From an enormous number of frequency characteristics which can be synthesised with this unit, it is possible to choose the one which is optimal for the hard of hearing subject. With this optimal field the intelligibility of speech is improved and persists even later in unaided listening. Furthermore, the unit is particularly useful in determining and fitting the individual hearing aid

Verbo-Tonal Method of Phonetic Correction: Each language has its own intonation, rhythm and sounds. The Verbo-tonal method for phonetic correction helps you to recognize these factors that make up the sound of a language and so improve your pronunciation.

Chapter 4

Teaching French Phonetics in a Digital Language Lab

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ABSTRACT

This chapter evaluates the pedagogical significance of a digital language lab as part of a university course in French phonetics. Based on both quantitative and qualitative evidence, it argues that a computer-assisted context can have positive effects on students' mastery of phonetic structures, as well as their overall engagement with the instructional process. Using empirical data from a set of controlled readings, the authors demonstrate that measurable progress was made by participants in their use of two targeted phenomena; unstable e and resyllabification. Furthermore, these conclusions are reinforced by feedback from a focus group that explored students' perceptions about how the learning environment contributed to their mastery of course content and classroom technology. While the intrinsic case study format used does not allow for general conclusions regarding correlations between instructional technologies and learning outcomes, it is hoped that the investigation will serve as a productive framework for future research.

INTRODUCTION

Since its creation in 1635, the French Academy (*Académie française*) has stood as the official arbiter on all matters related to the French language (Robertson, 1910). Today, it is best known—particularly outside France—for its efforts to stave off

Anglicization in the popular lexicon, a daunting task given the omnipresence of English language content on the Internet and in other media outlets. Nonetheless, the Academy endeavors to strengthen the linguistic foundations of French, publishing regular updates to an official dictionary (now in its ninth edition) and, in 1990, issuing an extensive new set of spelling rules aimed at simplifying both written and oral expression (Hargrove,

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1990; Nadeau & Barlow, 2008). Yet, even such continuous long-term linguistic refinement has not eliminated all ambiguity. This is particularly true of the complex and occasionally vague rules that govern French pronunciation and phonology. For second language learners, two of the most troublesome such features tend to be the *unstable e* (also known as *e caduc* or silent *e*) and phonological resyllabification involving the two similar yet distinct linguistic phenomena of *liaison* and *enchaînement*. In both cases, there are some rather well-established guidelines, but these are either incomplete or may vary depending on syntax, register, or rate of speech. As a result, it is not sufficient to merely recognize that a given word or passage may contain one of these particular components: A speaker must also determine whether or not its use is possible and appropriate given all relevant constraints. For this reason, most French Phonetics textbooks devote a considerable number of pages to each of these topics, and courses such as the one referenced in the present article usually review their practical application several times during a given semester. While Birdsong (1999) has suggested that mastery of specific structures is not a reliable indicator of global oral proficiency, incorrect or inconsistent use of a distinct attribute such as *liaison* is often the telltale sign of a non-native speaker (Morin, 2005). Since data from previous studies (Levy & Stockwell, 2006) suggest that computer-assisted language learning (CALL) may help to improve overall proficiency, it would seem that a closer look at its impact on learners' proficiency in these two pedagogically prominent areas of French phonetics and phonology would be a useful and needed addition to the scholarly corpus.

LITERATURE REVIEW

Digital Language Lab

The language lab (or lab), a term introduced by Waltz in 1930 (as cited by Hocking, 1967), with its inflexible audio speed (Harvey, 1978), inauthentic audio texts (Jones, 2008), and inferior sound quality (Balizet, Treder, & Parshall, 1999), looks very different from its descendant today, the *digital language lab*, which was ably described by Toner, Barr, Carvalho Martins, and Wright (2008) as:

... a classroom management system that enables a teacher to monitor and control student computers in the classroom or even at remote locations. ... Each student in a multimedia language lab has his/her own networked PC that opens up a suite of possibilities including use of dedicated CALL (Computer-Assisted Language Learning) packages and access to online sites in the target language They can play audio and video clips sent to them from the teacher's PC, answer quizzes, complete exercises set by the teacher, and return answers to the teacher for marking or comment. Teachers can monitor student progress from a central workstation and intervene where necessary. They can talk to students over a headset and take control of their keyboard and screen to demonstrate how to do something. They can broadcast their own screen to students, or pick out a student's screen and broadcast that to the whole class in order to show examples of good practice or initiate a discussion. (p. 4)

The above excerpt demonstrates best practices and what the digital language lab is capable of providing. In particular, the elements of an exemplary course conducted in a digital language lab include the activation of prior knowledge (Jones, 2008); promotion of interaction between students and text, students and teacher, and among students (Jones, 2008; Quinn, 2001); individualization and personalization of learning (Alexander, 2007;

Jones, 2008; Roby, 2004); use of multimedia in accordance with Paivio's (1971, 1986) dual coding theory; authentic texts (Jones, 2008) and tasks; autonomous learning (Alexander, 2007); and the opportunity to be a part of the global community (Shanklin, 2008). In addition, "technology skills as learning outcomes [have also been suggested as part of] a foreign language curriculum" (Shanklin, 2008, p. 436), a fact reiterated with the publication of the TESOL Technology Standards Framework (Healey, Hegelheimer, Hubbard, Ioannou-Georgiou, Kessler, & Ware, 2008).

This does not mean, however, that coursework completed in digital language labs is without its problems. The reduction of social interaction and social learning (Toner et al., 2008; Vanderplank, 2010) appears to be of particular concern. Furthermore, many researchers (e.g. Toner et al., 2008; Vanderplank, 2010) have lamented that the potential of these labs is not being maximized. In particular, pronunciation courses "that are more difficult to develop with the technology" (Toner et al., 2008, p. 18) need to be given greater and more thoughtful investigative attention. Arteaga (2000), for example, asserts that, with their attendant emphasis on intelligibility, phonetics and pronunciation study need once more to be the focus of work in the digital language lab.

A digital language lab such as the one used in the present study differs from older language labs not only in nature and functionality, but also in the demands it places on an instructor. Although from a technical point of view, language labs offer a broader choice and simplified delivery of instructional resources (e.g., CD-ROMs, language podcasts, international television broadcasts, and pedagogical websites), the main aspect of their effective use is closely tied to the extent to which the equipment is capable of enhancing tried and tested pedagogies and methodologies (Alexander, 2007).

However, because the transition to a digital learning environment does require considerable effort from instructional staff to either adapt existing pedagogical content and approaches or develop original material, a key budgetary

concern is the extent to which faculty will make use of its expensive hardware and software: The additional time and effort required is often more than faculty are able to spare. Furthermore, it can be difficult—as is often true of new pedagogical contexts and content—to convince students to access the language lab independently and thereby to ensure consistent, effective interaction with newly-developed course material (Wagener, 2006). As more and more courses shift to an online or hybrid delivery model, concerns about student engagement and course development will undoubtedly become even more acute. It is therefore not surprising that several recent studies contrast established paradigms of technologically-driven student learning with the realities of teacher and student expectations. Yet "while there are numerous studies of computer-based laboratories within the more general field of learning environments, there are few that are concerned with language learning" (Vanderplank, 2010, p. 6). Given some of the unique material needs and pedagogical challenges inherent to language instruction and acquisition, there is little doubt that an interest in and need for such research exists.

One area in which digital language labs have attracted a considerable amount of scholarly attention in recent years is that of speech technology. In particular, computer aided pronunciation training (CAPT) looks to become an interesting framework for its application. This new system promises several possible innovations to conventional teacher–student interaction: teachers could prepare lessons ad-hoc for an entire class or one specific student; students could practice pronunciation with a PC at home or at other locations that would present fewer potential stressors than a regular classroom; students with learning difficulties could benefit from extra technological support to make their learning experience and homework more dynamic and interactive; and the problem of low penetration of properly trained second language instructors in some geographic regions could be partially corrected with access to such tools. In addition, speech technology could potentially identify a specific error within an ut-

terance, and then provide feedback to correct it without any human intervention at all. Nevertheless, speech technology has its own limitations, and despite several decades of intense research and development efforts, the search for “plug-and-play” systems has met with repeated failure (Molina, Yoma, Wuth, & Vivanco, 2009).

Unstable e and Resyllabification in French

Often associated with the English schwa (with which it shares the IPA symbol [ə]), the French unstable e is nonetheless unique. First, like all French vowel sounds, the [ə] is, when correctly pronounced, a monophthong, though this is also true of schwa use in other languages, including English. However, whereas the English phoneme may occur within any vowel, its French equivalent is, save for a few very exceptional cases, always represented by an unaccented letter e (Dansereau, 2006). Yet, if the orthography of unstable e is remarkably consistent, its pronunciation is much less so. Usually referred to in French as *e caduc*, the Latin roots of this appellation (fallen; defunct) hint at the phoneme’s lost linguistic glory and, by extension, its contemporary complexity. Throughout the Middle Ages, French pronunciation was rather straightforward since virtually all letters were pronounced, regardless of their relative position within a word or logical sentence fragment. However, evidence from poetic texts indicates that the phonetic prominence of unstable e and other phonemes began to fade in the fourteenth century, leading in many cases to complete syncopation by the time the French Academy began its work in the seventeenth century. While the complete set of rules is rather lengthy, there are a few generally applicable guidelines for use of the French [ə] based on its position within an utterance. Simply put, occurrences of unstable e at the beginning of a word or word string are usually pronounced, whereas word-final occurrences should normally

be treated as silent letters. If the phoneme is in a median position, there is a time-honored, if somewhat imperfect, precept that governs its use. First proposed by Maurice Grammont in his 1894 article on a particular dialectal group in eastern France, this “law of three consonants” asserts that pronunciation of the unstable e is principally dictated by its neighboring phonemes (as cited in Laks and Durand, 2000). Thus, in the event that syncopation of an [ə] would result in the union of three or more distinct consonants (within a word or across pairs of words), the otherwise silent phoneme should be pronounced. Each of these general guidelines has some specific exceptions, and it is generally true that the faster or more informal one’s speech, the less likely one is to pronounce unstable e (Léon, 1966), particularly in cases where its pronunciation is deemed optional.

Resyllabification in French rests upon equally interesting historical grounds and similarly uncertain linguistic footing. Though similar phenomena exist in other languages (most notably in some Indian languages), the degree to which it occurs in French is rather unique. The first and more regular of these two is *enchaînement* which, as its name suggests, is a process whereby the final pronounced consonant in a word is joined, or “chained,” to the pronunciation of an initial vowel or vowel sound in the following word. Save for a few specific instances, this occurs without exception, and usually presents few difficulties for students, particularly once they have been exposed to both aural and written examples of its use. Though similar in function, the second such phenomenon is typically more difficult for students to master. Whereas *enchaînement* connects a pronounced consonant to a vowel in a neighboring word, *liaison* does the same for a consonant that would normally be silent. If this sounds vaguely similar to some of the preceding remarks regarding the unstable e, that is not without reason: Many instances of *enchaînement* and *liaison* only occur because of the elimination of a pronounced final e, which,

prior to changes in medieval pronunciation, was completely pronounced (Morin, 2005).

If the rules for the unstable *e* seem cryptic, then those for *liaison* are even more so, but there are a few central ones that may be noted. First, there are, as there were with the *e caduc*, some fixed cases that always require *liaison*. In general, the phenomenon occurs within groups of words where the functional relationship is high, such as in the case of an article or adjective and the noun with which it is associated (i.e. *les amis* [le za mi]). The same is also true of a subject and a verb, as well as monosyllabic prepositions and adverbs and their objects. However, cases in which liaison does not normally occur (e.g., a singular noun, proper name or impersonal pronoun and a verb, certain interrogatives) are numerous and subject to many exceptions.

METHODOLOGY

This study seeks to empirically evaluate the pedagogical effectiveness of a computer-assisted setting for language instruction that uses oral readings to measure students' progress in the production of both prosodic and segmented aspects of French. These readings, based on the referential model, require students to generate a linguistically accurate reading of the passage without referring to a prerecorded model. Instead, students are expected to draw upon existing knowledge of linguistic structures or previous experience with similar documents to analyze content and then use this analysis to guide their readings. The participant data gathered from readings that is examined in this study occurred as part of a standard intermediate-level university course in French phonetics. As a result, it does not address the impact of any particular instructional technique but rather the overall effects of a pedagogical context in which technology is leveraged as an integral part of both classroom instruction and student preparation.

Research Questions

The following questions were addressed:

1. How does a computer-assisted pedagogical context affect intermediate French students' pronunciation of the individual phoneme [ə] in a controlled production setting?
 - use of suprasegmental resyllabification in a controlled production setting?
2. To what extent, if any, does a digital language lab facilitate participants' acquisition of French phonetics?
3. What technology skills, if any, do participants acquire as a result of taking a French phonetics course in a digital language lab?

Setting

The class met three days per week, with one day devoted to discussion of theoretical concepts and regular quizzes and the remaining two used for practical oral exercises in the university's digital language lab, a modern classroom equipped with over 30 student posts, an instructor workstation and specialized digital language learning software that includes modules to facilitate instruction in all four areas of language acquisition (listening, speaking, reading, and writing). Like tape-based language labs, it allows instructors to share resources in the target language with the class and interact with them as they work on oral production exercises. However, a modern digital language lab is much more than a one-to-one replacement for the technology that preceded it. Rather, it should at the very least, to use terminology proposed by Pea (1985) and expanded by Hughes, Thomas and Scharber (2006), be considered an amplification of instructional practices and student learning. Because all pedagogical documents and recordings are stored and delivered digitally, the amount of material to which students are exposed increases,

often dramatically. This also means that learners have access to a much wider variety of inputs and exercises than before, including random pairings, student modeling, spectrographic analyses, and video demonstrations of buccal formation. Furthermore, when combined with some of the university's existing technology infrastructure, students are able to access many of these materials after hours, allowing them to extend their practice and collaboration beyond the classroom doors. This allows the instructor to develop techno-centric assignments that would have been impractical or inefficient to implement during normal class sessions, including peer review of recordings and web searches for examples of particular linguistic features (e.g., regional accent and varied use of pauses). Indeed, it behooves us to "explore ways in which the affordances offered by the new lab system might be most effectively exploited to enhance and facilitate language learning in the given context" (Barge, 2009, p. 2).

Participants

Twelve of the fourteen full-time students enrolled in the French phonetics course participated in this study during the Fall 2009 semester. At the beginning of the 15-week period, all would have been at some stage of intermediate proficiency as determined by the ACTFL scale, though some had more exposure to the target language than others thanks to prior participation in study abroad programs or completion of other French program courses with a focus on oral proficiency. Despite such variations, previous deliberate study of pronunciation and applied linguistics was very limited across the board. Furthermore, formal academic exposure to the language in general did not vary greatly. The linguistic background of participants was also relatively uniform, with nine native English speakers and three native bilingual speakers of both Spanish and English.

Of these twelve students, eight consented to participate in a focus group interview in Spring

2010. Most had double majors, consisting of French on the one hand and Art History, International Relations, International Business, German and Scandinavian Studies, and Elementary Education on the other. Some began learning French in high school while others began in college and, as mentioned earlier, most had spent at least one summer abroad in France.

Course Description

The pedagogical foundation for lesson design, feedback and evaluation in this course was based on two overarching objectives: a need for effective understanding of the systems that underlie accurate pronunciation and a reduction of noticeable errors. In class, a variety of listening and speaking activities were used to attain these instructional goals, some of which focused on recognition and repetition of specific forms and others a more holistic use of language. Generally, a first round of more imitative exercises for a particular phoneme or suprasegmental linguistic feature was completed, with the instructor using the digital language lab infrastructure to provide real-time feedback to students on the accuracy of their speech. Frequently, this took the form of direct oral commentary, but also included written feedback via an instant messaging tool or recorded audio and/or video clips to further illustrate the topic at hand. Based in part on performance during this opening series of activities, a second round was tailored to meet the needs of individual learners or small groups, and usually incorporated open-ended exercises that gave participants an opportunity to apply what they had just learned. In order to help learners accurately visualize phonemes and their linguistic interplay within a sentence or paragraph, regular phonetic transcription assignments were given. This written reinforcement seemed to be particularly useful when dealing with some of the more intricate features of French phonetics such as the two examined in this study.

Data Collection and Analysis

The research design was that of a mixed method approach, with the quantitative portion represented by Research Question 1 and the qualitative case study portion covered by Research Questions 2 and 3.

Quantitative Section

Data sources for Research Question 1 consisted of two sets of oral readings, for which paired t tests were conducted between the two readings, required and forbidden aspects of unstable e, and required and forbidden aspects of resyllabification. Collection of these readings occurred in Weeks 8 and 15 of the course, a timeline that was chosen to coincide with mid-term and final exam scheduling and to allow for adequate introductory training with the digital language lab software. In both cases, the selected passages were unaltered excerpts from authentic documents in the target language of approximately 60-80 words. Prior to recording the passage, students were given 20 minutes to examine it, take notes about its specific phonetic content or linguistic register, and even rehearse. Final recordings were then made, collected and graded by the instructor.

For pedagogical reasons, participants were neither penalized for nor informed of each and every error made in their readings. Rather, feedback included a narrative summary of the overall strengths and weaknesses of the reading with some specific examples to highlight positive features or underscore problem areas for improvement. They were, however, provided with a written and recorded key of the first passage and asked to review it as part of a series of follow-up activities that also leveraged some of the technologies available in the digital language lab. For instance, each student was asked to locate accurate examples of his or her problem areas by consulting archived exercises from previous sessions or via an online search for authentic videos and recordings. Par-

ticipants were also paired randomly using digital language lab software and asked to identify specific mistakes they had made in practice readings. The second passage was evaluated in a similar fashion. However, given its proximity to the end of the academic term, there were no follow-up activities assigned. For the purposes of this study, both sets of recordings were analyzed a second time in order to ensure a more rigorous tabulation of content and targeted phonetic structures. The results from this targeted data analysis were then used to explore possible answers to the first of three research questions outlined above.

Qualitative Case Study Section

In this research study, the case study phenomenon of the learning that occurred in a French phonetics and phonology course was studied in its natural context of a digital language lab in Fall 2009. It was an intrinsic case study because the researchers “want[ed] to know more about a particular ... group ... [They were] not necessarily interested in examining or creating general theories or in generalizing their findings to broader populations” (Hancock & Algozzine, 2006, p. 32).

Data sources consisted of a focus group interview because “[g]roup interviews capitalize on the sharing and creation of new ideas that sometimes would not occur if the participants were interviewed individually” (Hancock & Algozzine, 2006, p. 39). The 31-minute audiotaped focus group interview was transcribed verbatim using Express Scribe <http://www.nch.com.au/scribe/>. The data was then organized using NVivo 7.0 (QSR International, 2007), a qualitative research software. Data was coded inductively (Merriam, 1998) according to arising themes. The focus group interview questions sought to primarily answer Research Questions 2 and 3, as follows:

Questions 1-5 focused on Research Question 2:

1. Tell me a little about yourself. What is your name? What is your experience with French?

Table 1. Participant grades for controlled readings

Readings	Mean	Std. Deviation	Reading 1 – Reading 2					
			Mean	Std. Deviation	Std. Error Mean	<i>t</i>	<i>df</i>	Sig. (2-tailed)
Reading 1	86.8%	4.88%	-2.3%	1.39	.40103	-5.714	11	<.001
Reading 2	89.1%	5.47%						

2. What were your perceptions about learning French in the digital language lab?
3. Do you think using the digital language lab affected the development of your spoken French? How? To what extent?
4. Which features of the digital language lab were most useful to you in developing your spoken French? Please be as specific as possible.
5. From your perspective, did training in the digital language lab affect your conversational fluency? For example, has your comprehension of other speakers changed since taking the course? Has their understanding (from your point of view) of you changed?
9. Is there anything else that you want to tell me that pertains to the use of the digital language lab in general or the use of the digital language lab with French in particular?

RESULTS AND DISCUSSION

Research Question 1

According to Table 1, the mean performance of all learners increased from 86.8% ($SD = 4.88\%$) on Reading 1 to 89.1% ($SD = 5.47\%$) on Reading 2. These significantly different means ($p < .001$) suggest that learners demonstrated both greater overall mastery of the phonetic and phonological content and more significant progress between the two readings.

Possible explanations for such a difference could be explained by uncontrollable factors (i.e., study habits, computer literacy, access to native speakers) since all learners participated in the same class activities and evaluations.

However, the data itself point to a more nuanced conclusion than the one suggested by the overall summary of students' graded performance. Specifically, participants made much greater progress in their mastery of resyllabification than in their

Questions 6-9 focused on Research Question 3:

6. Which technology features were already familiar to you and which were new?
7. Are there any technologies that were not used in the course but that you believe could be useful in such a course?
8. Were there any technology skills that you learned as part of this course that you now use or may use in the future?

Table 2. Summary of participant's use of unstable *e* in controlled readings

Unstable e	Mean	Std. Deviation	Reading 1 – Reading 2					
			Mean	Std. Deviation	Std. Error Mean	<i>t</i>	<i>df</i>	Sig. (2-tailed)
Reading 1	93.6%	4.53%	-1.0%	5.31	1.53	-.655	11	.526
Reading 2	94.6%	4.20%						

Table 3. Summary of participant's use of resyllabification in controlled readings

Resyllabification	Mean	Std. Deviation	Reading 1 – Reading 2					
			Mean	Std. Deviation	Std. Error Mean	<i>t</i>	<i>df</i>	Sig. (2-tailed)
Reading 1	52.8%	15.63%	-35.4%	17.46	5.04	-7.028	11	<.001
Reading 2	88.2%	9.03%						

use of unstable e. As shown in Table 2, learners' mean performance of unstable e, although not statistically significant, increased from 93.6% (*SD* = 4.53%) on Reading 1 to 94.6% (*SD* = 4.20%) on Reading 2. A possible explanation is that participants showed proof of a solid mastery of [ə], even in the first reading.

Table 3 shows that the means for participants' performance of resyllabification on the two readings are significantly different ($p < .001$). Participants' mean resyllabification scores increased from 52.8% (*SD* = 15.63%) on Reading 1 to 88.2% (*SD* = 9.03%) on Reading 2: Overall accuracy in use of *liaisons* and *enchaînements* thus experienced a mean increase of 35.4%, while correct use of unstable e mentioned earlier changed only very slightly, increasing by just 1.0%. A possible reason for the incredible progress could be because the scores on the first reading were so very low:

There are other possible explanations for the 35.4% mean increase on accurate use of resyllabification. However, based on feedback obtained during the focus group, it would seem that feedback from the instructor during the course and the variety of course content were factors that students consider to have been major contributors to their comprehension of course material. Students showed the most noticeable advances in identification of required *liaisons*, progress that was encouraged by a regular and varied collection of oral, written, aural and computer-based exercises to reinforce key rules and concepts of resyllabification. The digital language lab installation not only simplifies delivery of such content dur-

ing class, but also helps to simplify its preparation for instructors.

Research Question 2

Possible reasons for the results of Research Question 1 may be suggested in the findings for Research Questions 2 and 3. To begin, an examination of the codes and the number of references for each code suggests the relative importance of the themes found in the focus group interview is shown in table 4.

The theme with the most references (16 references) pertaining to the effect of the digital language lab on French acquisition was the use of *varied activities*. This included completing exercises in the textbook with their corresponding soundtrack where participants were able to “[hear] natural ... native speakers with a crisp diction,” repeating the exercises, and recording the activity. Participants were also able to listen to their own recordings, obtain immediate feedback from the professor, and delayed feedback of end-of-section graded activities. Peer correction and peer dialogue based on conversations from the textbook were also conducted.

Participants liked the variety. Comments included:

- “I like the fact that there are multiple ways of learning like the book itself would have a few pages explaining the sound like where you find it or how you use its rules and stuff, and so you'd read through that, and sometimes it would be difficult to read,

Table 4. Focus group themes arranged according to number of references

Research Questions	Themes	Number of references
Research Question 2: Effect of the digital language lab on French acquisition	Varied activities	16
	Immediate feedback	10
	Improved oral French	10
	Textchat	6
	Boost confidence	5
	No assessment anxiety	5
	Self-assessment	5
	Self-reliance	5
	Isolated	3
	Teacher feedback	3
	Delayed feedback	2
	Interactive	2
	RAT framework	1
	Self-paced	1
Research Question 3: Technology skill acquisition	Technical problems	8
	New possibilities	7
	Spectrograph	6
	Possible new technologies	4
	Familiar technological features	2
	New technologies learned	1

but then we'd go over in class, and then we'd do an activity together, and then we'd do the activity in the digital language laboratory, and it was just that repetition and the different forms of like seeing the way his mouth moves, you did the words, and then hearing it in the digital language laboratory, the recording, so that you recognize and remembered how he did it, and then you'd hear it over again, and the recording, and then you'd do it, so. I like the mixture though."

- "It was like a multimedia class"
- "the ability to record yourself, I think, was a big part of the program that helps"
- "I could probably say that it was my favorite French class"

It was also noteworthy that the use of varied activities *boosted participants' confidence* (5 references):

"It's very interactive, because you'd have your exercises in front of you, and then you'd also have the corresponding soundtrack to it so that you'd hear it, you'd repeat it, and then it was also recorded. ... I noticed that the confidence level was there simply because like I think when it comes to speaking a language and we're not confident, there's a lot of stage fright, and then you like second guess yourself, then you start stumbling over words or grammatical structure. When it's just you and the book and the program, you kind of like mentally tune everyone out and it's just you learning for yourself, and then having critiques from the, so it felt like a one-on-one session with the professor, as opposed to a collective group."

In particular, the individualized learning of a “one-on-one session with the professor” with its attendant *immediate feedback* (10 references) *improved participants’ oral French* (10 references). Other comments pertaining to improved oral French included:

- “deconstruct[ing] the word to its smallest utterance of meaning,” then reconstructing it
- producing and hearing previously indistinguishable sounds, thus improving comprehension
- gaining confidence and therefore speaking ability
- “started talking to other people”
- “when we see maybe an unfamiliar word or anything like that, now we know how to phonetically spell it out, we can pronounce it correctly without even knowing what it is, and then go from there”
- “I learned probably the most being in that class.”

The immediate feedback mentioned previously came in the form of *textchat* (6 references) “if we just need to work on something very minimal ... [or the instructor wanted to] give us encouragement about our work and our progress” and audio feedback; the latter was particularly popular with participants, “The headsets and being able to communicate with your professor, so the fact that he ... can listen to everybody and speak to us individually through the headset was very, very helpful” partly because “not knowing he was listening kind of helped too like you weren’t nervous about it, you just were doing your activity and then he would say something, and you were like, “Oh he’s listening. OK, now I need to correct this.” In other words, the audio feedback *preempted assessment anxiety* (5 references). Furthermore, the fact that the instructor listened in on participants one at a time and was usually able to get to all participants during a particular class session also

meant that participants were working individually most of the time, which was appreciated because it encouraged *self-reliance* (5 references): “It’s very individualized ... I feel that with this class, it was very isolated in terms of like what you know and then how far you can progress yourself.” Another said, “having the ability to do things on your own really builds your confidence, and I think that is a huge step to take from learning a language.” Yet another participant shared:

“I think it helps boost your confidence because you don’t think or are aware that other people are listening to you, so you’re kind of in your own zone, so you actually make an effort to try to progress and listen to what’s going on inside of that headset and then do the exercises and following with the book was really helpful as well.”

Based on the excerpt above, learning French phonetics in the digital language lab resulted in an increase in participants’ confidence, an ability to *self-assess* (5 references), to be self-reliant, and to obtain immediate feedback from the instructor in an atmosphere devoid of assessment anxiety.

Research Question 3

Participants did reveal that there were *technical problems* (8 references) like having difficulty finding a file in a folder, issues with the headset and the mute button (where participants were focusing on the software when the computer itself was on mute), and ports for the headset and microphone getting accidentally switched. As a participant revealed, “Well, it was because it was so simple, you just assume that everything should work, that you wouldn’t make mistakes, simple little things.”

Indeed, this suggests that the *technology was familiar* (2 references) to the participants:

“I thought the entire thing was very familiar simply because like being that we are more like technologically advanced, even from like a

younger setting, like I knew what a headset was, and like how to record ... it was an interesting combination of applying all those together to achieve French learning as opposed to just like general communication and conversation. Like the IM, or the instant messaging, like that's obviously everyone knows how to use that, you put a headset on that has a microphone, you speak into it. There are some programs that you feel like it's a really simple concepts but compiling them altogether was very effective learning."

Having said that, however, participants did suggest *possible new technologies* (4 references), including the use of the spectrograph, accessing the software from home, and Skyping. *New technologies learned* (1 reference) during the course included using the university online storage space available to students. Participants also suggested other *new possibilities* (7 references) like offering more courses that incorporate a technology component (oral communications, grammar, and vocabulary courses were mentioned), and introducing the digital language lab software to third or fourth year high school French students. A particularly popular request was an advanced phonetics course. More than one participant declared that they would take such a course.

IMPLICATIONS

It is clear that participants in this study enjoyed the course and found that it helped to improve their oral proficiency in French. Their reactions both reinforce and are confirmed by data from the controlled readings that were the other primary component of this study. Given the relatively small class size, it is clear that future research will be needed in order to confirm some of the conclusions that may be drawn from this preliminary examination. Nonetheless, a few key implications stand out. First, as suggested in the literature review, the instructor must, regardless of the technol-

ogy available, remain actively involved in the instructional process: For the moment, this is the only way to ensure that students will receive the immediate *and* personalized feedback that they value. Second, the considerable progress made by participants, particularly as concerns the correct use of resyllabification, affirms that the language labs of today are capable of teaching more than just imitative pronunciation skills. Finally, the fact that the students involved in this study expressed a genuine satisfaction with the course and an interest in continuing their study of phonetics is, in our opinion, an encouraging sign for even further development of digital teaching resources, a process that should involve both teachers and students in order to ensure maximum contextual relevancy and pedagogical efficacy.

FUTURE RESEARCH DIRECTIONS

The collected data and their implications for second language pedagogy point to several possible areas for additional inquiry. One of the most relevant possible areas to the present study would be to incorporate complementary data that would perhaps help to more fully account for participants' use of variable linguistic features such as unstable e and resyllabification. For example, since rate of speech has noticeable effects on speakers' inclusion of both structures studied here, it may help to clarify some of the usage patterns discussed above. Vigneau-Rouayrenc (1991) addresses a similar question in her discussion of the role of rhythmic or accentual groupings in the retention or deletion of unstable e: It would, we believe, be fascinating to see how training in the digital language lab could refine this aspect of its use. A slightly less empirical, yet equally interesting and relevant way to extend this research might be to conduct a similar study of student groups both before and after they have studied abroad. Such research could examine not only general correlations between overseas immersions, but

also potential regional and dialectical influences, variances that are already well-documented among groups of native French speakers. Another obvious enhancement would be to conduct a more controlled analysis of the effects of specific CALL activities on learners' mastery of targeted phonetic and phonological structures. Finally, focus group feedback highlights the significant and potentially positive role still to be played by instructors in a predominantly digital classroom environment.

CONCLUSION

Research findings suggest that conducting a French phonetics class in a digital language lab does indeed have positive effects on students' learning of French phonetics. The progress made in mastery of two of the most difficult aspects of spoken French is fascinating and requires further research. Ultimately, changes to course content or organization may need to be effected to maximize student learning of all areas of French phonetics. Students' acquisition of technology skills as a result of taking a French phonetics course in a digital language lab also holds much promise, particularly for institutions that, like the one examined here, will be training the next generation of language teachers. Furthermore, what is learned can be disseminated to the other language programs in the department and across the university. Among possibilities are "teacher training and development programmes ... [and a] booklet of lesson suggestions" (Barge, 2009, p. 13). In other words, the digital language lab has the potential to become much more than just a room filled with expensive computer equipment and software: Helping students connect academic readings with practical skills, generating new instructional strategies, and encouraging a pedagogy that can live and breathe outside classroom walls, its role in second-language acquisition and related research will no doubt be a significant one in the years to come.

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“all languages skill areas, and contents” (Egbert, 2005, p. 3)

Digital Language Lab: Networked instructor and student computers with dedicated CALL software that enable individual and group language learning activities in all four skills and one-to-one and one-to-many instructor participation from a central workstation (Toner et al., 2008).

Enchaînement: Pronunciation of a pronounced word-final consonant across a syllable boundary with the initial phoneme of the following word if that phoneme begins with a vowel.

Liaison: Pronunciation of an otherwise silent word-final consonant across a syllable boundary with the initial phoneme of the following word if that phoneme begins with a vowel.

Resyllabification: A phonological process whereby syllable boundaries between words are modified, a process that can involve a number of different operations, including In French, it occurs in the related phenomena of *enchaînement* and *liaison*.

Self-Reliance: “reliance on one’s own efforts and abilities” (Merriam-Webster Online Dictionary, 2010)

Unstable e: Referred to by several terms (silent e, *e caduc*, etc.) pronunciation or elision of this word-final schwa [ə] in French varies depending on the surrounding phonemes, as well as rate and register of speech.

KEY TERMS AND DEFINITIONS

Computer-assisted Language Learning: Optimal use of technology, namely “systems that rely on computer chips, digital applications, and networks in all of their forms” (TESOL, 2008, p. 3) to support language teaching and learning of

APPENDIX A: SUMMARY OF STUDENT RESULTS FROM READINGS

The table below summarizes student results as well as class averages for the four readings examined in this study. In each case, the total number of required and forbidden instances of unstable e or resyllabification is indicated in column A, participants' usage of these structures and overall accuracy is detailed in columns B through M, and class averages are noted in column N.

A	B	C	D	E	F	G	H	I	J	K	L	M	N
Use of Unstable e in Reading Passage A													Average
Required (10)	10	10	9	9	10	10	9	10	10	9	10	10	9.67
Forbidden (12)	11	10	9	12	11	11	12	11	10	12	12	10	10.92
Accuracy (%)	95%	91%	82%	95%	95%	95%	95%	95%	91%	95%	100%	91%	94%

APPENDIX B: OCCURRENCES OF UNSTABLE E IN READINGS

All actual or potential occurrences are indicated by a bold underline, with required (R), forbidden (F) and optional (O) usage denoted in the superscript following each occurrence.

Reading Passage A

Le^R diable^F habitait une^O humble^R chaumiè^Fre sur la côte^F; mais il possédait les prairie^Fs baignées d'eau salée, les belles^F terres^F grasse^Fs, les riches^F vallées et les coteaux féconds de^R tout le^R pays; tandis que^R le^R saint ne^R régnait que^R sur les sables^F. De^R sorte^F que^R Satan était riche^F, et saint Michel était pauvre^O comme^F un gueux.

Reading Passage B

Et, en face^F d'elle^F, la Corse^R sauvage^F est restée telle^F qu'en ses premiers jours. L'être^F y vit dans sa maison grossiè^Fre, indifférent à tout ce^O qui ne^R touch^Fe point son existence^F même^F ou ses que^Rrelles^F de^R famille^F. Et il est resté avec les défauts et les qualités des races^O incultes^F, violent, haineux, sanguinaire^F avec inconscience^F, mais aussi hospitalier, généreux, dévoué, naïf, ouvrant sa porte^F aux passants et donnant son amitié fidèle^F pour la moindre^R marque^F de^R sympathie^F.

APPENDIX C: OCCURRENCES OF RESYLLABIFICATION IN READINGS

All actual or potential occurrences are indicated by a double underline, with required (R), forbidden (F) and optional (O) usage denoted by a letter placed above those lines.

Reading Passage A

Le diable R habitait O une R humble chaumière sur la côte; mais O il possédait les prairies baignées d'eau salée, les belles terres grasses, les riches vallées F et les coteaux féconds de tout le pays; tandis que le saint ne régnait que sur les sables. De sorte que Satan F était riche, et saint Michel R était pauvre comme R un gueux

Reading Passage B

Et, en face d'elle, la Corse sauvage R est restée telle qu'en ses premiers jours. L'être R y vit dans sa maison grossière, indifférent F à tout ce qui ne touche point son R existence même F ou ses querelles de famille. Et F il R est resté avec les défauts F et les qualités des races O incultes, violent, haineux, sanguinaire avec R inconscience, mais O aussi hospitalier, généreux, dévoué, naïf, ouvrant sa porte R aux passants F et donnant son R amitié fidèle pour la moindre marque de sympathie.

Chapter 5

Effects of an E-Learning Platform for EFL Chinese Learners

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ABSTRACT

As English has been increasingly recognized as one of the influential factors for China in taking parts in global community, students and Chinese professionals need to participate in international seminars and conferences, and internationally collaborate with academics through the lingua franca, English. Hence, being able to speak intelligible English has unavoidably become a necessity, especially for Chinese university students. The purpose of this chapter focuses on the implementation of constructive role plays (CRP) via the NHCE e-learning in learning English as a foreign language classes. This chapter exploits quantitative and qualitative methods such as pretest, post-test, student questionnaires and student role play recording analysis to collect data to demonstrate the effectiveness of CRP on Chinese university students' spoken English development. Results showed that there was a significant increase in the students' speaking proficiency for the experimental group as compared to the control group. The results also indicated that CRP has been highly successful as an effective aid in improving EFL students' speaking. The NHCE e-learning platform can provide a motivating environment for L2 students to practice spoken English. However, the empirical results showed that the use of online audio chat facility to perform the CRP may make some students feel anxious, due to its synchronized nature. This suggests that its use should be carefully considered in relation to divergent groups of learners.

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INTRODUCTION

Currently, English speaking has become ever more important in people's daily lives especially in the international arena. However, it is very difficult for Chinese students to speak with other people in English effectively. The term 'dumb English' used to describe Chinese students' inability to communicate in English in the 1980s and 1990s (Hu, 1988; Weng, 1996) is still used today to describe students' English learning in China, especially in Chinese universities.

Computer assisted language learning (CALL) has been suggested as one plausible way of improving college English learning and teaching curriculum in China. The Chinese College English Curriculum recommends that computer-assisted language learning should utilize a task-based language learning and teaching approach and be based on constructivism in college English learning and teaching (as cited in Xu, 2007, *College English Curriculum Requirements*, pp. 29-30). However, it is not clear exactly how e-learning can be employed to promote the development of the speaking skill in the College English curriculum.

At the College English Department of Guizhou University, the New Horizon College English E-learning, the only e-learning platform among universities in Guizhou province, was implemented since 2004. New Horizon College English (henceforth, NHCE) e-learning offers online computer laboratory practice based on the NHCE textbooks. Because the learning activities are online, students are able to engage in self-study activities at any time of their choosing. Moreover, it can also be used in a traditional classroom setting to supplement both EFL instruction and learning (Xu, 2007).

However, the existing NHCE e-learning does not seem to be an adequate platform to develop EFL learners' speaking skills in English. An evaluation of NHCE e-learning platform revealed that activities contained in the NHCE e-learning are behavioristic in nature especially in the role

play section (Wang & Wang, 2005). These role plays are usually teacher driven with objectives pre-determined by the content of the textbook. Speaking activities involved students role-playing designated roles by mechanically repeating language used by the roles through reading pre-set scripts.

Though the NHCE e-learning materials are conducted through advanced computer technology, the approach the learning materials take is more akin to audiolingualism than the task-based approach based on constructivism suggested by the College English Curriculum Requirements. Research on the extensive implementation of NHCE e-learning for college English classes further revealed that students who finished the repetitive role plays did not improve their spoken English (He & Zhong, 2006). Further questionnaire administered by the research team at Guizhou University on the use of NHCE e-learning platform showed that 50.33% of the students (N=300) reported that they learned little from the existing NHCE e-learning in their speaking classes. 43.83% of the students also felt that they were bored while doing the speaking activities on the e-learning platform.

Since Guizhou University spent a great deal of money implementing the NHCE E-learning platform, it is not economically viable to simply abandon the system. In this chapter, we would like to present research that investigates whether it is possible to enhance the role plays on the NHCE e-learning platform through 'constructive role plays' (CRP).

'Constructive role plays' are role plays based on the principles of constructivism. Four epistemological assumptions are at the heart of what is referred to as "constructivist learning." (taken from <http://www.prainbow.com/cld/cldp.html>)

1. Knowledge is physically constructed by learners who are involved in active learning.

Table 1. Characteristics of behavioristic and constructive role play

Behavioristic role play	Constructive role play
1.no task instructions 2.students read role scripts out 3. read preset role play scripts from the computer screen 4. fill-in-the-blank exercise	1.Active pre-chat students and teacher preparation of the tasks; 2. students chat online without reading the role scripts; 3.pre- and post chat scaffolding provided; 4. on-line or off-line interactions for feedback purposes; 5. teacher logs; 6. student online learning logs;

2. Knowledge is symbolically constructed by learners who are making their own representations of action;
3. Knowledge is socially constructed by learners who convey their meaning making to others;
4. Knowledge is theoretically constructed by learners who try to explain things they don't completely understand.

The four epistemological assumptions have been incorporated in the design of 'constructive role play'. The following (Table 1) outlines the differences between behavioristic and constructive role plays use in this study.

In CRP, students and staff were actively involved in pre-task preparation activities on the tasks. Students were given opportunities to actively ask questions and explore how the task could be carried out more successfully with the help of fellow students and the teacher. Secondly, because students were not allowed to see the scripts, they could draw inspiration either from their previous studies (thus causing them to actively engage with their long term memory or through knowledge generated from the tutorial class (a social activity). Thirdly, as pairs of students were engaged in constructing the role plays from memory, they were engaged in meaning making and had to learn to adjust their meaning according to the changing circumstances of the role plays. Fourthly, students were provided with many opportunities for group or individual feedback and reflection through teacher logs, students' online learning logs and on-line or off-line interactions. In other words, in CRP, in the process of learning

reflection and feedback were always available while students completed the task at hand.

Literature Review

The use of CRP through chat rooms can be loosely classified as using internet-based audio conferencing facilities to practice spoken English. In the context of second language acquisition (SLA) theories, the benefits internet-based audio conferencing have largely been investigated through the interactionist theory of language learning. The input hypothesis (Krashen, 1985), the interaction hypothesis (Long, 1983), the output hypothesis (Swain, 1985), and the noticing hypothesis (Schmidt, 1990) are some of the hypotheses that underpin the interactionist theory of language learning. While the input hypothesis considers comprehensible input as the main requirement for SLA, the output hypothesis emphasizes the role of comprehensible output, i.e. language production, through which the learner's interlanguage can be stretched. Interaction enables language output to be made comprehensible through negotiation of meaning using techniques such as recasts, confirmation checks, clarification requests, comprehension checks, and so on.

However, there is very little research on the use of internet audio chat such as Skype or MSN for language learning. Kinoshita (2008) reported positive effects on the use of iChat, a real time audio-video chat program in Japanese L2 learning. Through audio-visual internet-based video conferencing, L2 learners of Japanese were given opportunities to practice oral communication with L2 learners of English in Japan. As part

of the scaffolding, the teacher in the Australian university also provided L2 learners of Japanese in Australia, in advance, discussion topics to enable them to prepare a vocabulary list and related expressions to communicate with Japanese native speaker partners via the iChat program. L2 learners of Japanese were reported to have developed teamwork and communication skills, and engaged in the learning process actively and collaboratively. The reticent participants were found to converse more in the target language via the iChat communication than in the normal class communication practices in both countries. At the end of the semester, the participants were able to perform better and with more confidence in the oral communication using the target language. Findings from the surveys indicated that participants were highly motivated to learn and had positive opinions towards the incorporation of the internet-based intercommunicative tools in the L2 speaking class.

While audio conferencing through internet chat seems to offer students opportunities to speak more in an L2, whether such activity causes students' anxiety or not in speaking the L2 is still under researched. Foreign language anxiety is defined as "a distinct complex of self-perceptions, beliefs, feelings, and behaviors related to classroom language learning arising from the uniqueness of the language learning process" (Horwitz, Horwitz, & Cope, 1991, p. 31). It "makes the individual unreceptive to language input" (p. 30) thus inhibiting students to speak in a foreign language. Warschauer's research in using synchronous written communication through the internet points out that participation is more equal compared to face-to-face environments (Warschauer, 1996). In written mode, it is believed to provide a freeing experience, whereby students are less concerned about making mistakes and feel less anxious (Kern, 1995). Beauvois (1997) further argued that it (computer mediated communication) is "an anonymous, less pressured environment that tends to lower the affective filter" (p. 171).

Another factor that could lower the affective filter is the scaffolding provided by the teacher. Scaffolding is defined as the "role of teachers and others in supporting the learner's development and providing support structures to get to that next stage or level" (p. 81). Scaffolding is essentially temporary, and the ultimate aim of scaffolding is to enable the learner to complete the task or master the concepts independently (Chang, Sung, & Chen, 2001; Hartman, 2002; Ellis, Larkin, & Worthington, 2002). Savery and Duffy (2005) found that learners used scaffolding provided by teachers for their individual problem solving. Scaffolding provides a clear direction and reduces learners' confusion and tension (McKenzie, 2000). It is also advisable for teachers to provide scaffolding before, while and after students work role plays out so that students can reduce tensions when performing role plays in class (Alwahibee, 2004; Harmer, 1984; Kondo & Yang, 2004).

In the present study, role plays were the *only* avenue for Chinese university students to practice speaking English in a Teaching English as a Foreign Language (TEFL) environment. Role play is but a simulation of communicative encounters based on role descriptions. They can be behavioristic or constructive (Kasper & Rose, 2002). Behavioristic role play requires students to repeat the language used by role play characters. Constructive role plays (CRP) are more active and interactive (Ge, Lee, & Yamashiro, 2003; Northcott, 2002; Van Ments, 1999; Woodhouse, 2007). Constructive role plays allow students to test out their knowledge that they already have, and/or to study the new knowledge by interacting with the group members. In the present study, constructive role plays instruct students to "act the role out without scripts" rather than "reading the role scripts out" on NHCE e-learning.

Research Purpose and Questions

The present study investigates the effectiveness of constructive role plays (CRP) via the NHCE e-learning in learning English as a foreign lan-

Table 2. Grading criterion of the CET-SET test

Scoring Bands	Category 1 Veracity and Language scope	Category 2 Length of the talk and Continuity	Category 3 Agility and Pertinence
5	Correctly use of grammar and words. Plenty of words and complex structure Good pronunciation	When discussing topic, examinee can use continuous words and talk for a relative long time	Examinee can join the conversation naturally and freely The use of language is quite suitable to certain situation.
4	Some mistakes of the use of grammar and words Pronunciation is ok	Examinee can conduct a continuous talk, but with short and simple content. Examinee often stops	Examinee can actively join the conversation, but sometimes cannot talk with partners quite well The use of language is ok for some certain situation
3	Mistakes of grammar and words affect the conversation Simple structure of language use and simple words Some pronunciation problems	Short conversation Often stops when think about topics but can finish the basic part of talking	Examinee cannot join the conversation actively. Sometimes examinee cannot match the topic with some certain situation
2	There are many mistakes of the use of grammar and words. It affect the talk a lot Poor pronunciation	Very short and examinee cannot do the continuous talk	Examinee cannot join the group discussion

guage classes in China. A range of data has been collected to demonstrate the effectiveness of CRP on Chinese university students' spoken English development. Effectiveness was measured in terms of the change in pre- and post speaking test scores obtained from the CET Spoken English Tests (CET-SET). The national CET Spoken English Test was used as the speaking pretest and post-test in the present study because firstly, it is a standardized national test and the topics are familiar to students and relevant to the College English Curriculum. The difficulty level of CET-SET topics is not too difficult or too easy, and all of the topics are related to students' daily lives (Yang and Weir, 1999). Secondly, as shown in the following table below, the existing CET-SET grading system provides systematic criteria for marking students' speaking score. The CET-SET grading system is found to be a suitable and valid instrument for testing the spoken English skill (Yang & Weir, 1999). Two non-native speaking experienced examiners carried out the grading

of the pre- and post speaking tests for both CG and EG students. Examinees were graded using grading criterion specified (see Table 2).

The present study addresses the following research questions:

1. How effective were constructive role plays for improving English speaking performance of students with different levels of proficiency?
2. What were experimental group students' opinions on the constructive role plays via e-learning in their college English speaking classes?

Research Design of the Present Study

Participants and Procedure

In the present study, the sample was purposely selected from second-year non-English majors who

Table 3. Summary of students' classifications in terms of proficiency level

Proficiency level	Numbers of Students
High	29 (EG: 14; CG: 15)
Medium	193 (EG: 97; CG: 96)
Low	38 (EG: 19; CG: 19)

Key: EG: Experimental Group; CG: Control Group

enrolled in the college English course at Guizhou University, in which one of the researchers teaches. The second-year non-English major students had already finished their college English level 1, 2 and 3 studies and have had about six years experience in learning English. These students were also familiar with using the existing NHCE e-learning platform. Secondly, all the students have attained some level of proficiency in spoken English after they finished their previous college English studies. Textbooks for this course were the College English level 4 textbooks which were aimed at the second-year undergraduate non-English majors. This study was conducted from March to July 2009, the second semester of academic year 2008-2009 over 18 weeks. In the 18-week research study, all 300 students were required to study 8 units of the *New Horizon College English* (Zheng, 2003) textbook.

Six classes were chosen in this study with 50 students in each class. The total number of the participants was 300 students. This sample size was deemed sufficient to make reliable generalizations according to Khaimook's (2004) sample size estimation formula.

The participants were divided into three groups, high proficiency (Hp), medium proficiency (Mp), and low proficiency (Lp) by converting the previous English final examination mark to a z score (Pallant, 2007) as well as by converting the pre-test speaking test scores to a z score. High proficient students in this study refer to those whose z scores from the former English final examination and the speaking pretest were more than 1.00 ($z > 1.00$). Medium proficient students refer to those whose z scores from the former English final examination and the speaking pretest were between -1.00 and

1.00 ($-1.00 \leq z \leq 1.00$), while low proficient students refer to those whose z scores from the former English final examination and the speaking pretest were less than -1.00 ($z < -1.00$). Some students were excluded from the data analysis because those students' z scores derived from the final examinations and the z scores derived from the speaking pretests allocated that those students to two different proficiency levels. 39 such students were then excluded from the data analysis process. All in all, 260 students were randomly assigned into an experimental group of 130 students and a control group of 130 students. The composition of the high, medium, and low proficient students in both EG and CG were illustrated in Table 3.

Then students in each proficiency group were randomly divided into a control group (CG) and an experimental group (EG). Students in the experimental group worked with the constructive role plays and the students in the control group carried out the existing behavioristic role plays. Both of the two groups presented their role plays through NHCE e-learning platform used in their speaking English classes.

In EG, in each session, before asking students to do the role play, the researcher presented objectives of the unit; identified the role play tasks for students; provided students with language input, such as new words, sentences structures and so on. Then, three videos were shown to students in order to check students' understanding of the role play. Students were then randomly assigned into groups of two by the computer and put into chat rooms on the e-learning platform. After that, students began to act three similar role plays out by interacting with their partners in the chat rooms using microphones and earphones for 30 minutes.

All students were in the same computer lab for these interactions.

All of the students' conversations were recorded automatically by the e-learning system for teacher's feedback, grading and discussion. After students finished studying each unit, students in EG were asked to write online learning logs and posed questions through the discussion forum on the NHCE e-learning. Assistance and answers to students' questions through discussion forum on the e-learning platform, and/or face to face interactions in classroom were provided while students were in the process of performing role plays in EG. Scaffolding was an essential part of the learning process and was provided through the provision of instructions, answers, and feedback to students. Students' ability to pose questions on the discussion forum, representing peer to peer interactions, was also part of the scaffolding.

In contrast, the students in the CG worked with the existing behavioristic role plays after seeing the videos of sample role plays. Then, students carried out three similar role plays by reading the role scripts out to each other in pairs through the chat rooms for 30 minutes. All of the students' conversations were also recorded automatically by the e-learning system. After students finished three role plays, they were required to finish a fill-in-the-blank quiz on the e-learning platform as a test of learning.

After the 18-week instructional period, students from both CG and EG took CET-SET post-test for speaking. The post-test mean scores for

both groups were compared to the scores of the pretests to examine gains in scores. The topics for the pretest and post-test were the same in terms of difficulty. The concern about the influence of students' pretests scores on the post-tests scores was minimal because the 18-week instruction period was long enough for students to forget what they talked about in the pretests. The data obtained from the pretest and the post speaking tests were used for quantitative analysis.

RESULTS

Results of Pre-Post Speaking Tests

After the 18-week experiment on implementing constructive role plays via e-learning, all 260 participants from both CG and EG were post-tested.

In response to the first research question:

“How effective were constructive role plays for improving speaking performance of students with different levels of proficiency?”

the speaking post-test scores were compared with the pretest scores to determine the effects on speaking performance of students after doing constructive and behavioristic role plays via e-learning. First of all, a paired t-test was done on the data for CG and EG (Table 4).

As shown in Table 4, there was a statistically significant difference between the two pre- and

Table 4. Comparison of the pre-and post speaking test scores between the experimental group and the control group

Group	Scores	Mean	SD	n	df	t	Sig.
EG	Pretest	8.912	.8223	130	129	-18.113**	.000
	Post-test	10.481	1.4895				
CG	Pretest	8.935	.8454	130	129	-.199	.842
	Post-test	8.957	.7745				

EG: Experimental Group; CG: Control Group

** t value of experimental group is significant at the 0.05 level (2-tailed)

post tests scores ($p = 0.000 < 0.05$), and the mean score of the post-tests (10.481) was higher than that of the pretests (8.912) in the results for students in EG. This means that students in EG noticeably improved on their speaking performance in the post-tests. However, in results for students in the CG, there was no statistically significant difference between the two speaking tests scores ($p = 0.842 > 0.05$), and the mean scores of the pretests and the post-tests were nearly the same (8.935/8.957). This indicates that students in the CG demonstrated little improvement in their speaking ability after the 18-week study. EG's improvement would most likely to be caused by CRP.

A two-way factorial analysis of variance (ANOVA) was conducted to explore the impact of language proficiency on the change between the pre- and post speaking test scores as measured by the CET Speaking Test for the students in CG and EG. Subjects in CG and EG were divided into three groups according to their proficiency levels (Hp, Mp and Lp). The changes in pre- and post Speaking test scores between the groups

was statistically significant with $p = .000$. The effect size for the changes between groups was quite large (Partial Eta Squared = 0.419). As for the changes in pre- and post Speaking scores for each proficiency level within CG and EG, the differences are also statistically significant with $p = 0.006$ and an effect size of 0.039. The interaction effect between proficiency levels and groups also is statistically significant with $p = .000$ and an effect size of 0.131.

The following plots show the estimated mean value of changes between the post and pre speaking test scores (post-pre) for various subgroups of the experiment. They are a visual representation of the ANOVA results showing significant effects due to the main effect of group (Figure 2), proficiency (Figure 1) and their interaction (Figure 1).

Figure 1 shows that as proficiency goes up, the mean post-pre difference in speaking scores goes up slightly for CG but decreases for EG.

Figure 1 shows that when EG is compared to CG, Post-pre change is always increasing but most for students in the Lp, second most for Mp and

Figure 1. Estimated mean change in score (post – pre) by group and proficiency

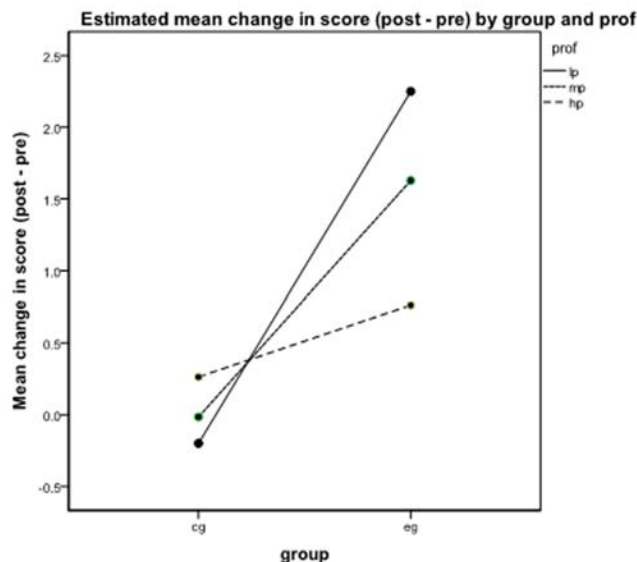
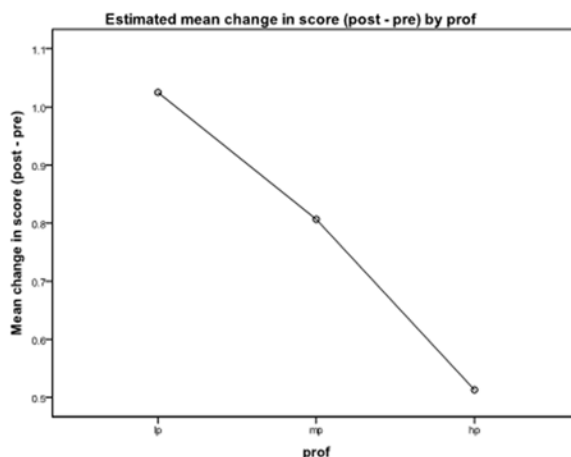


Figure 2. Estimated mean change in score (post – pre) by proficiency



least for Hp. This confirms the positive interaction between group and proficiency.

Ignoring all other effects, Figure 2 shows that as proficiency goes up, the post-pre change in speaking scores goes down. We emphasize that the change in test score is still positive for all levels of proficiency, just not as highly positive as the proficiency goes up. This graph confirms the significant effect of proficiency on outcome.

Figure 3 shows that comparing EG to CG, post-pre change in speaking scores goes up. This confirms the significant positive effect of group on outcome.

In the previous section, it has been established that students' English speaking ability in the EG undoubtedly improved when compared to students in the CG. However, it is worth digging further to find out exactly *where* students improved in their post tests compared to the pre-tests. This would help researchers to understand what skills learned in the CRP sessions were transferred to general every day conversations and what aspects of CRP might need to be improved. Unfortunately only 8 grading scripts of the CET-SET test for students from the EG were made available to this research.

Table 5 contains the CET-SET speaking scores achieved by different proficiency groups of students in EG and CG. It can be seen that students in the EG improved a great deal in the posttests while students in the CG did not improve much in the post test.

According to Table 6, eight students in the EG seemed to have improved most in their ability to participate in discussions and speak up in group situations with an average gain of 0.875 in the Category 3 criterion (Table 2). This is followed by their increased ability to talk continuously (as aspect of fluency) with an average gain of 0.813 in the Category 2 criterion of Table 2. However, the smallest increase of 0.563 was in Category 1 (i.e. accuracy of grammar). This is disappointing as it indicates that while students gained in fluency (defined as faster rate of speech and more effortless talk), they did not improve equally in terms of grammatical accuracy.

Results of Student Questionnaires

Another source of evidence to support the efficacy of constructive role-play comes from student questionnaire responses to answer the second question:

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Figure 3. Estimated mean change in score (post – pre) by group

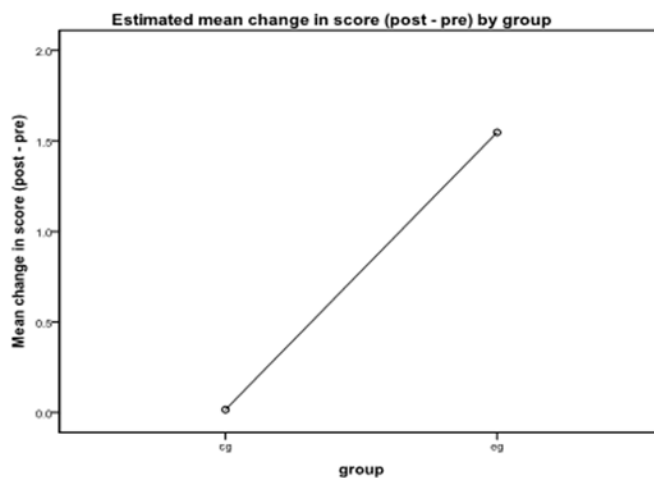


Table 5. CET-SET scores achieved by different proficiency groups of students in EG and CG

student	prof.	Experimental group (n=8)					
		pretest			posttest		
		cat.1	cat.2	cat.3	cat.1	cat.2	cat.3
1	lp	2.5	2.5	3	3	4	3
2	lp	2	3.5	2	2	3.5	3.5
3	mp	3	3	3	3	4	4
4	mp	2.5	3.5	3	4	4.5	4.5
5	mp	2.5	2.5	3.5	3	3	4
6	hp	3	3.5	3.5	3	4	4.5
7	hp	3.5	3.5	4	4.5	4.5	4.5
8	hp	3	3.5	3.5	4	4.5	4.5
average		2.75	3.19	3.19	3.31	4	4.06
Control Group (n=7)							
students	prof.	pretest			posttest		
		cat.1	cat.2	cat.3	cat.1	cat.2	cat.3
9	lp	2.5	3	2	2.5	3	2
10	lp	2.5	2.5	3	3	2.5	2.5
11	mp	3	3.5	3	3	3.5	3
12	mp	3.5	3	3	3.5	3	3
13	mp	3	3	3	3	3	3
14	hp	3.5	3.5	3.5	3.5	3	3.5
15	hp	3.5	3.5	3.5	3.5	3.5	3.5
average		3.07	3.14	3	3.14	3.07	2.93

Table 6. CET-SET scores changes achieved by different proficiency groups of students in EG

Students	Proficiency	Experimental Group		
		cat1post-cat1pretest change	cat2post-cat2pretest change	cat3post-cat3pretest change
1	lp	0.5	1.5	0
2	lp	0	0	1.5
3	mp	0	1	1
4	mp	1.5	1	1.5
5	mp	0.5	0.5	0.5
6	hp	0	0.5	1
7	hp	1	1	0.5
8	hp	1	1	1
	average	0.563	0.813	0.875

Key: hp: high proficiency; mp: medium proficiency; lp: low proficiency

“What were students’ opinions on the constructive role plays via e-learning in their college English speaking classes?”

After students finished their 18-week study, 130 of the students in the experimental group answered an evaluation questionnaire. A 5-point Likert-scale ranging from “strongly agree” to “strongly disagree” was used in the questionnaire. Students’ responses to the questionnaires were coded and keyed into the SPSS program for statistical analysis.

Item 1, the percentage of students who agreed that the instructions were necessary for them to get better understanding on how to carry out constructive role plays is 93.8%, 93.9% and 89.5% (% of strongly agree and agree) in the Hp, Mp and Lp.

In terms of the affective dimension of the CRP, from item 2, 7.1%, 17.5% and 15.8% (% of undecided plus disagree) from students in Hp, Mp and Lp respectively indicated that some students in Mp and Lp groups found CRP less interesting. Similarly, from responses for item 3, 7.1%, 9.2% and 15.8% from students in Hp, Mp and Lp respectively indicated that some students

at the lower proficiency levels found CRP less enjoyable.

As for whether CRP offered students useful information on whether they could speak idiomatic English (item 4), 7.1%, 24.7% and 36.8% of students at Hp, Mp and Lp respectively did not feel that they could get information on how to speak idiomatic English from CRP. This could highlight the fact that students did not know the role of the original videos of the role plays in the process of CRP and did not know what constitutes idiomatic English in the original videos and thus could not be certain whether they have been helped by the process of doing CRP in this area.

As for whether CRP enabled students to produce similar conversations (item 5), 14.3%, 29.9% and 26.4% of students at Hp, Mp and Lp respectively were unsure or disagreed that they could produce similar conversations.

As for item 6, 92.9%, 81.4% and 84.3% of students at Hp, Mp and Lp respectively agreed that CRP improved their speaking performances. This perception was also confirmed by increases in their post-test CET oral performances. As for whether CRP motivated students to practice more, 21.4%, 29.9% and 31.6% of students in Hp, Mp and Lp respectively were not sure or disagreed.

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Table 7. Mean responses from student questionnaires on the Likert-scale (N=130)

Item	Proficiency level	Strongly agree %	Agree %	Undecided %	Disagree %	Strongly disagree %
1. The instruction before performing constructive role plays via e-learning is necessary. 构建型角色扮演活动开始前的说明部分是必要的	HP	50.0	50.0	0	0	0
	MP	32.0	61.9	4.1	2.1	0
	LP	21.1	68.4	5.3	5.3	0
2. The constructive role plays via e-learning are interesting. 构建型角色扮演活动是有趣的	HP	57.1	35.7	7.1	0	0
	MP	41.2	41.2	16.5	1.0	0
	LP	42.1	42.1	10.5	5.3	0
3. The constructive role plays via e-learning make learning to speak English enjoyable. 构建型角色扮演活动使得英语口语生动有趣	HP	64.3	28.6	7.1	0	0
	MP	45.4	45.4	8.2	1.0	0
	LP	57.9	26.3	10.5	5.3	0
4. The constructive role plays via e-learning offer me useful information on how I can speak idiomatic English. 构建型角色扮演活动为我提供了关于英语口语的有用信息	HP	50.0	42.9	7.1	0	0
	MP	19.6	55.7	21.6	3.1	0
	LP	15.8	47.4	21.1	15.8	0
5. The constructive role plays via e-learning help me generate similar conversations easily. 构建型角色扮演活动有助于我容易地构建出其他类似对话	HP	28.6	57.1	14.3	0	0
	MP	14.4	55.7	25.8	4.1	0
	LP	10.5	63.2	21.1	5.3	0
6. The constructive role plays help me improve my speaking performance. 构建型角色扮演活动有助于我的口语技能的提高	HP	50.0	42.9	7.1	0	0
	MP	26.8	54.6	14.4	4.1	0
	LP	21.1	63.2	5.3	10.5	0
7. The constructive role plays via e-learning motivate me to practice more. 构建型角色扮演活动激励我更多的参与英语口语	HP	28.6	50.0	21.4	0	0
	MP	22.7	47.4	25.8	4.1	0
	LP	15.8	52.6	26.3	5.3	0
8. The constructive role plays via e-learning should be utilized more in speaking classes. 构建型角色扮演活动应该在口语课堂上多使用	HP	35.7	42.9	21.4	0	0
	MP	17.5	49.5	27.8	5.2	0
	LP	26.3	42.1	26.3	5.3	0
9. I feel shy and/or hesitant when performing the constructive role plays via e-learning. 角色扮演我感到害羞、巴巴	HP	7.1	21.4	35.7	21.4	14.3
	MP	14.4	39.2	22.7	21.6	2.1
	LP	15.8	15.8	26.3	36.8	5.3
10. I feel nervous when I act the role out with my partner via e-learning. 在和同伴表演角色的时候我感到紧张	HP	0	35.7	35.7	7.1	21.4
	MP	10.3	42.3	17.5	24.7	5.2
	LP	15.8	26.3	31.6	26.3	0
11. I find that time is not enough for me to act the role out in class. 我得每堂课上老定的角色扮演时间不够用	HP	0	35.7	35.7	21.4	7.1
	MP	10.3	23.7	47.4	16.5	2.1
	LP	0	26.3	47.4	15.8	10.5
12. I prefer reading out the role script to acting the role out with a partner. 我更喜欢角色的台词而不喜欢和同伴行角色表演	HP	0	14.3	14.3	42.9	28.6
	MP	0	20.6	24.7	40.2	14.4
	LP	0	0	21.1	52.6	26.3

78.6%, 67% and 68.4% of students in Hp, Mp and Lp felt CRP should be utilized more in speaking classes (item 8). However, in item 9, 28.5%, 53.6% and 31.6% of the students from Hp, Mp and Lp respectively felt shy and hesitant when doing CRP.

For item 10, "I feel nervous when I act the role out with my partner via e-learning." 35.7%, 52.6% and 42.1% of the Hp, Mp and Lp students agreed that they felt nervous when acting the role play out.

To the question "I find that time is not enough for me to act the role out in class", 66.9% of the students in EG found that they did not have enough time to act out the role', 35.8%, 34% and 26.3% felt that there was enough time to finish the role play in class. This further confirms the finding that students from all proficiency levels might find audio chat role plays difficult.

To the question, "I prefer reading out the role script to acting the role out with a partner", only 14.3% and 20.6% of students in Hp and Mp preferred reading out the role script. Most students preferred acting out the role rather than reading the scripts.

The responses to the questionnaire items revealed that students felt anxious when performing constructive role plays via e-learning (items 9 and 10). Kotter (2001) also suggested that audio chat would be more beneficial to "learners of at least intermediate competency in the target language" (p. 347) as "synchronous CMC places a higher cognitive load on the learner and, as such, is better suited to higher proficiency learners" (Stockwell, 2004; cited in Rosell-Aguilar, 2005, p. 422). However, in this study, more students in the Mp group felt more hesitant and shy. Satar and OZdener (2008) suggested that for beginner-level students or students of a lower proficiency, text chat can be as effective as voice chat for the development of speaking skills. Satar and OZdener also found that there was a significant decrease in anxiety for the text chat group.

The questionnaire also contained a number of open questions. In the open questions section, students were asked to make suggestions on how to improve CRP. Firstly, 75.4% of the students with different language proficiency levels (12 students from Hp, 74 students from Mp and 12 students from Lp) agreed that the teacher could help them learn how to enlarge the vocabularies and how to improve pronunciation.

Secondly, 17.7% of the students with medium (15 students) and low (8 students) proficiency levels suggested that the teacher could provide students more time on imitating role plays via NHCE e-learning and focus on working out one role play in class, then the teacher could give assignments for students to prepare the rest of the role plays and let students perform the rest of the role plays in the next class. According to the students, by doing this, students could gain more opportunities and time to prepare and practice, as a result, the effects might be better than performing those three role plays immediately in class without preparation. This request echoed ways used by students to alleviate anxiety in Kondo and Yang's study (2004).

Thirdly, there were 78.5% of the students with high (12 students), medium (86 students) and low (4 students) language proficiency levels who agreed that the teacher could provide more opportunities to work on constructive role plays outside the speaking class so that students could keep practicing speaking in the whole learning process.

DISCUSSION

The study showed that there was a significant increase in the students' speaking proficiency for the experimental group compared to the control group. Specifically, significant increases have been found in students' ability to participate in discussions (Criterion 3 Table 2) and to talk at

length and to continue talking (Criterion 2 Table 2). However, in terms of grammatical accuracy (Criteria 1 Table 2), the increase was not as great. Students' responses in the questionnaires also reflected their concern that CRP did not help them much in speaking idiomatic English. Similarly, questionnaire data (item 9-10) reveals that students felt nervous and shy while conducting CRP. Students' suggestion to alleviate anxiety confirms the findings of Kondo and Yang (2004). In this project, students from all proficiency levels carried out CRP using audio chats. However, in order to alleviate the foreign language anxiety experienced by Mp and Lp students, a different arrangement of teaching for lower proficiency students could have been used.

The qualitative results of this study beg the question 'What kind of scaffolding from the teacher can help students to improve in the accuracy and idiomatic nature of their language use?' What kind of scaffolding process and/or procedures might alleviate the anxiety felt by students as well as improving their long term language production? Liu and Jackson (2008) teachers should discuss with their students in the very first lesson the significance of using their class as a safe environment for speaking English and share with them the feeling of anxiety experienced by many people when they learn an FL. But is providing clear instructions on how to conduct constructive role plays via e-learning enough to relieve this nervousness? What kind of scaffolding can the teachers provide in order for students to *notice* the idiomatic nature of the English language?

Perhaps, the simple gesture of telling the teacher by the textbook writers (especially important when the teacher is a non-native speaker of English), which bit of the language is the idiomatic language the students are supposed to learn is enough to direct students' attention to the idiomatic nature of the English language in the texts. This act alone might be able to enable

students to improve the idiomatic nature of their spoken English.

In the transcripts of the role plays contained NHCE e-learning system, there are many formulaic sequences such as idioms and metaphors. Recent research has shown that there is a fluency benefit to pedagogy which involves noticing of formulaic sequences and the encouragement of automatization as well as memorization. In the study of O'Brien, Segalowitz, Freed, and Colletine (2007), phonological memory was found to be significantly associated with L2 fluency development in adult L2 learners as measured by temporal variables such as speech rate and length of runs. This suggests that the ability to store phonological sequences in short term memory is an important factor in language learning. The study of Wood (2009) offers many useful pedagogic strategies for training L2 students to notice, automatize and memorize formulaic expressions. Other pronunciation related features such as the linking of certain sounds in phrases can also be highlighted in the scaffolding process.

Research Limitations

In interpreting the results, it was assumed that the technical properties and the automatic recording feature of the Internet site affected the experimental group and control group to a similar degree. Because of the uneven number of students in each proficiency groups (Hp=29, Mp=193, Lp=38), it was impossible to investigate features of non-native speaker to non-native speaker interactions in the role play sessions. Similarly, because the computer randomly created pairs each session, only limited data on features of such interactions were produced.

CONCLUSION

In general, the results of the study emphasize that constructive role play has been highly successful

as an effective aid to improve speaking skills. The NHCE e learning platform can be a safe environment for L2 students to practice spoken English. However, the empirical results reveal that constructive role play using online audio chat facility, due to its synchronized nature, still caused students anxiety. This suggests that its use should be carefully considered in relation to divergent groups of learners. The results of this study also point to the importance of investigating what constitutes scaffolding. Further research on different ways of scaffolding students will also be instrumental in improving L2 students' spoken English fluency in terms of both accuracy and fluency.

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KEY TERMS AND DEFINITIONS

Extra-Linguistic Knowledge: includes our knowledge of the world and of the situation, that is, the context. The +1 represents new knowledge or language structures that we should be ready to acquire.

Foreign Language Anxiety: is defined as "a distinct complex of self-perceptions, beliefs, feelings, and behaviors related to classroom language learning arising from the uniqueness of the language learning process" (Horwitz, Horwitz, & Cope, 1991, p. 31)

Input Hypothesis: If *i* represents previously acquired linguistic competence and extra-linguistic knowledge, the hypothesis claims that we move from *i* to *i*+1 by understanding input that contains *i*+1.

Output Hypothesis: Swain (1985) develops the idea that for full grammatical competence to be developed, learners need to be pushed into the

production of comprehensible output. Though comprehensible input may lead to understanding, it does not involve the development of syntactic plans which production processes require.

Scaffolding: is defined as the “role of teachers and others in supporting the learner’s development and providing support structures to get to that next

stage or level” (p. 81). Scaffolding is essentially temporary, and the ultimate aim of scaffolding is to enable the learner to complete the task or master the concepts independently (Chang, Sung, & Chen, 2001; Hartman, 2002; Ellis, Larkin, & Worthington, 2002).

Chapter 6

Constructionism in Action within European eTwinning Projects

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ABSTRACT

The European eTwinning programme, as part of the Lifelong Learning action has reached thousands of schools in Europe and beyond. It becomes a cultural trend in education where various theoretical grounds, managerial ideas, and practical solutions meet. Thus, in this chapter, eTwinning is presented as a practical collaborative implementation of ICT tools in education. Furthermore, an attempt to theorize it as an emerging trend, which combines communicative approaches to language learning, is made, including constructivist ideas – both social and cognitive, followed by constructionism as the key background concepts. A reference to other concepts, such as European Key Competences for Lifelong Learning and the feminist angle is made to contextualize the situation in schools. The conceptual framework is linked with the school practice in the ICT-based learning environment within the eTwinning programme. Further description, case studies, and evaluation of the results will be presented.

INTRODUCTION

eTwinning programme launched in 2004 in Europe as a practical solution aims at providing a safe environment for cooperation between schools from various countries. Teachers and schools are supported to find partners – at least one from a different country. Having agreed on the type, duration, on the content of collaboration they register a project in the eTwinning database. Since then they are able to use the eTwinning portal to store and exchange project materials, as well as communicate using emails, chats and blogs. The partners may use an ICT infrastructure that is available for them, for example Virtual Learning Environments, videoconferencing software, and messengers. Teachers are encouraged to participate in the programme and helped with its ICT infrastructure by National Support Services in each country. The practical side of the programme is the focus of attention of teachers and managers. There are few attempts to theorize the programme's activities on the ground of pedagogy and methodology of language learning (Zeilder et al. 2007, Uzunboylu 2006, Gajek, Poszytek 2009). That is why, in the article, the programme is investigated from various pedagogical and social perspectives which provides an insight into eTwinning as an educational and cultural trend.

On the one hand, over the last decades, constructivist approaches – both cognitive and social – discussed in pedagogy have been followed by constructionism, based on ICT-enhanced learning. They emphasize the aspects of human development: mental – constructing knowledge in the learner's head; social – learning by co-operation and discussions with others; and material making material representations of ideas. On the other hand, communicative approaches to language learning concentrate on the active role of the learner, that is learner autonomy (Holec 1981), authenticity of learning activities and materials in meaningful communication acts (Widdowson 1979), as well as communication perceived as

an active and collaborative undertaking (Nunan 1992). Furthermore, task-based, project-based, content-based and collaborative language learning have been widely applied in relevant learning contexts. In a particular learning situation, the issue of how to meet the needs of the learner and the requirements of external factors, such as the curriculum and parents' expectations, is the main concern of the teacher. Within eTwinning action, all the approaches are implemented in a manageable way, accepted by teachers and attractive to learners. The large scale of the programme indicates the need for a study – to observe, identify and describe the development of a new ICT-based learning environment on a large scale at primary and secondary levels. The focus of the study is to describe the characteristic features of the multinational learning environment and evaluate the results, as well as promote examples of good practice.

THEORETICAL BACKGROUND

Anne Gilleran (2010) – Head of the Central Support Service of eTwinning – stated that when European Schoolnet answered the European Commission's call in 2004, the aim of the programme was perceived as a means of empowering learners through technology. Thus, originally it is rooted in practice rather than in theory. However, whilst looking at the activities from the perspectives of pedagogical and methodological theories, it turns out that various theoretical approaches interrelate in eTwinning projects, despite the fact that teaching practitioners' focus is on tasks suitable for the needs of their learners, not especially on implementation of any theory. In the process of explaining the phenomenon, two sets of theoretical approaches are of particular interest. The first one is constructionism with its precedents – Vygotskian social constructivism and Piagetian cognitive constructivism. The second set of approaches comes from the methodology of teaching

foreign languages, namely the communicative approach, which is task-based, project-based and co-operative language learning. The third argument that is worth mentioning in the analysis of the learning environment within the eTwinning programme comes from policy makers who have adopted key competences as the basis for education of the future.

Constructivism and Constructionism Applied in eTwinning Projects

Constructivism is a theory of learning, which assumes that children cannot acquire knowledge from parents or teachers. Knowledge is not transmitted, it is constructed by the learners. Vygotsky (1971, 1981) and his followers emphasized the role of culture and cultural mediation in child development. He focused on the zone of proximal development that is a child's potential. In ZPD tasks that are too difficult for the child working on his or her own, these can be fulfilled with help and assistance from others: carers or peers. Vygotsky used the term scaffolding to describe the level of support which makes progress accessible to the child. He also emphasized that the dialogue between the learner and assistants is a means of transforming unsystematic, spontaneous concepts into logical and rational ones. The process of creation meaning takes place in interactions between individuals and with the environment in which they live in. For Vygotsky's followers, learning is an active process in which learners discover concepts and facts for themselves. According to them, reality is constructed by human actions because it does not exist prior to social intervention. Thus, people as members of society invent the properties of the world (Kukla 2000). This trend is called social constructivism.

The numerous participants of the eTwinning programme create educational reality by their social interventions in the world. They establish the properties of the world in which learners and teachers, belonging to different cultures, speaking

different languages, and functioning in different policy requirements, can find common interests and areas for co-operation, and can be able to produce mutually satisfactory results. The role of ICT as an element of scaffolding is essential for the existence of the reality. In the environment extended socially – by participation of members of other cultures and languages (but not immigrants), and technologically – contact takes place synchronously or asynchronously via ICT – the processes of the creation of meaning differ from such process taking place in the same place and at the same time.

Piaget's main focus was on the inner processes that make learning possible (Piaget 1970, Piaget, Inhelder 1966). He emphasized the role of adaptation, accommodation and assimilation of a child to the learning environment. According to him, children have their own strong views of the world, which are constantly evolving through contacts with others and things. As a result, children do not take directly what they see and hear, but they interpret and adapt to their own previous knowledge and experience. Hence, the experience is essential for learning. Piaget also noticed that resistance to new concepts is part of learning. Therefore, the proposal of how to understand keeping a balance between stability and change, closure and openness, continuity and diversity makes this approach productive for understanding learning processes in eTwinning projects. The learning environment in which children have to evaluate concepts of the world that differ from their own native concepts is very productive in the case the communication with foreign partners. This trend, which stresses the role of mental processes, is called cognitive constructivism.

The constructivist approaches are criticized for not being as effective as direct instruction – particularly for novices, who do not have the necessary “mental models” as conditions for learning by doing (Sweller 1988, Mayer 2004).

The use of the constructivist approaches in the classroom leads to vital practical assumptions.

The ideas implemented into teaching practice result in the following characteristics (Gray 1997):

- the learners are actively involved
- the environment is democratic
- the activities are interactive and student-centered
- the teacher facilitates a process of learning in which students are encouraged to be responsible and autonomous.

Jonassen (1999) proposed the following activities as appropriate activities in a constructivist classroom: a case study, long-term project or problem perceived as multiple cases, and projects integrated at the curriculum level. He perceived the teacher as a model, a coach, and scaffolding facilitator.

In language learning, constructivist approaches have been widely discussed (Felix 1999, 2004, 2005). Concluding her analysis of pedagogy in the third millennium, Felix (2005: 96) states that in helping students to achieve a high level of proficiency and accuracy in language learning, all kinds of technologies should be used. On the one hand, static and dynamic technologies provide automated activities to engage students in “autonomous, predominantly cognitive and metacognitive processes”. On the other hand, “with the help of networked systems, it would involve them in collaborative, process-oriented real-life activities, fostering psycho-social processes”.

The constructionist approach introduced by Seymour Papert (1980), originally related to the use of technology in learning. Papert – a mathematician, computer scientist, and significant contributor to the development of artificial intelligence – developed a LOGO turtle computer-based learning environment to help children learn programming. As a co-worker and follower of Piaget, he introduced a learning theory – constructionism. Developing Piaget’s constructivist ideas, Papert claimed that people create mental models to understand the world. However, he stated that

to do this they need to make tangible objects in the real world. Thus, the role of external aids, in particular, digital objects, is emphasized. According to constructionists, three types of processes are equally valid for development: that is, mental processes – building mental representations, social processes – co-operation and discussions with others, and operating processes – building and manipulating material representations of abstract ideas. A child is encouraged to use his or her initiative to design “objects to think with”. In comparison with constructivist ideas, constructionism is more pragmatic, more situated in a material, that is digital reality. What is more, he and Harel noticed that “... feminist scholars have argued that many women prefer working with more personal, less-detached knowledge and do so very successfully” (Papert, Harel 1991). So, this approach to knowledge and learning may attract at least half of the population. He also stresses the validity of getting into unknown situations, even at the cost of a sense of loss.

Firstly, constructionism was applied to teaching maths and programming, by helping learners to experiment rather than instruct them what to do. Therefore, a constructionist teacher takes the role of assistant, mediator and supporter giving up direct teaching and clear instructions what to do. Nowadays, with growing technological impact on education, Papert’s ideas can be applied to all subjects, including language learning. To present this approach briefly, it is indeed worth recalling the eight big ideas of constructionism by Seymour Papert (Stager 2005: 46-47), which cover the following aspects of learning:

1. Learning by doing
2. Using technology as building material
3. Enjoying hard fun
4. Learning to learn
5. Taking time for learning
6. Being wrong is a step to being right

7. Learning community embraces teachers and learners
8. Using technology NOW for learning everything else.

Although Papert (1980) himself perceived the LOGO computer system as the best environment for learning whilst implementing the eight ideas. They are also productive for the analysis of the learning processes in international projects within the eTwinning programme. Application of these eight big ideas in eTwinning projects will be exemplified in the findings section of this article.

Application of Communicative Approaches to Language Learning

Communicative approaches stress the role of meaningful interaction between learners of foreign languages from the very early level of proficiency. In classroom settings, such communication rarely resembles natural interaction with a real cultural context. Although communicative approaches have introduced a substantial change in the practice of teaching languages, there still has been a gap between theoretical declarations and limitations of the learning environment which is bordered by four walls of the classroom, two covers of a textbook, and five days of a working week. The class setting rarely provides a multicultural environment for learning a foreign language. Among the communicative approaches three are of particular interest for the analysis of eTwinning projects. They are: Project-based language learning, Task-based language learning, and Co-operative language learning.

Although the means of communication can be the native language of one or both partners from two countries, the majority of participants communicate in a foreign language. Hence, a sufficient command of at least one common foreign language is vital for success in the project.

Nowadays, successful intercultural communication is perceived as the main aim of language

learning, as well as the ability to function in multilingual social environments. Any products of project work in international teams are the results of successful intercultural communication.

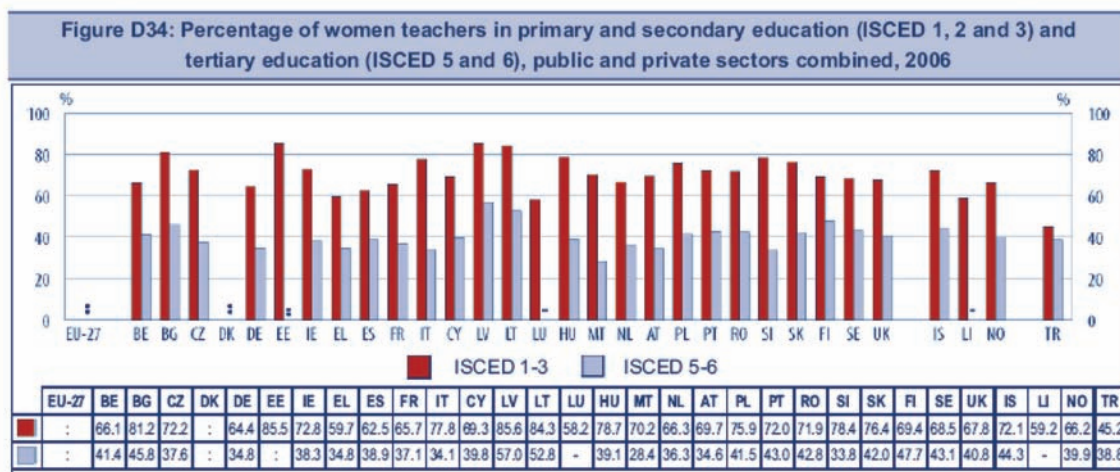
Competence-Oriented Views on the Process of Change Introduced by eTwinning

The policy document entitled Key Competences for Lifelong Learning – A European Reference Framework issued by the European Parliament in 2006 is presented here as it helps to contextualize the situation in schools where eTwinning projects are undertaken. The document reflects updated political interest in the quality of education. Its long tradition reaches Thomas Jefferson, who declared literacy to be the key to citizenship. In the 19th century, the three R's metaphor (Reading, wRiting, aRithmetics or Reckoning) illustrated the skills expected to be acquired by school-leavers. Since the end of the previous century many signals coming from the business world have revealed gaps between the profile of a learner equipped with knowledge and skills at school, and the requirements of employers. Such a gap triggered political actions. Many organisations have got interested in identifying the competences needed for the societies of the future, with the example of The Partnership for 21st Century Skills publishing Framework for 21st Century Learning in 2004. OECD (Organisation of Economic Co-operation and Development) publishes regular reports titled Education at a Glance. Futurologists of education re-formulated their own lists of competences for the citizen of the future, and suggested necessary actions (Wagner et al. 2005, Wagner 2008).

In the European context, the competences described by EU institutions in the document mentioned above are as follows:

1. Communication in the mother tongue;
2. Communication in foreign languages;

Figure 1. Women teachers in education in Europe. (Source: Key Data on Education in Europe 2009 p. 181)



3. Mathematical competence and basic competences in science and technology;
4. Digital competence;
5. Learning to learn;
6. Social and civic competences;
7. Sense of initiative and entrepreneurship;
8. Cultural awareness and expression.

The implementation of the competences is widely discussed in educational systems. Participants of each eTwinning project set out to develop all the competencies. However, the emphasis in a particular one depends, to some extent, on the main theme of the project (Gajek 2009).

Although the two sets of theoretical approaches presented above and the policy document come from different traditions, they provide a multi-dimensional framework for understanding learning processes observed in international projects, in which language and technology are means of meaningful communication. Thus, there have been various ideas and trends inspiring and influencing education towards innovation, which contains empowerment of the learner, emphasis on co-operation, integration of linguistic, digital, intercultural, subject and social skills. Practical implementation of any educational innovation

needs to be well-embedded in current school practice, so that participants perceive their actions as evolutionary change which gets support from various stakeholders, such as headmasters, school authorities, parents and sponsors.

Feminist Angle on the Use of ICT

To expand Papert and Harel’s remarks about women’s preference to work in personalized environments, and to contextualize the environment in which eTwinning projects are implemented, it is necessary to stress that in school systems in most European countries, women compose the majority of teachers at primary and secondary levels, what is presented from the Euridice report, 2009, in Figure 1. This is the main reason why the majority of teacher participants in the eTwinning programme are women.

At this stage of adoption of technology, digital tools as a means of communication are still a factor that needs consideration. They cannot be treated as invisible in a way that pencils are treated in the process of writing, for writers do not mind the tool they use. Digital tools are still noticeable while used. That is why the insight into how women use technology is valid for under-

standing the processes in eTwinning projects. Feminist research in education shows that women and men use digital technology in a different way. Women use computers for communication, advice, sharing experiences and emotions (Fallows 2005:5). In addition, women do not appreciate their computer knowledge and computer skills, as revealed by Thiessen (2006) and Looker (2008: 780). The more complicated the computer task, the more girls tend to be less confident in approaching it (Meelissen 2005, Meelissen 2008:391). Some researchers claim that co-educational classes are not the best place for girls to practice computer skills (Cooper, Weaver 2003, Sanders 2005:13, Looker 2008:781). Volman et al. (2007) claim that women and girls tend to lower their computer competence, whilst men and boys tend to exaggerate their computer skills. However, the results vary from region to region, because in America and Europe computers are perceived as belonging mainly to the male area of interest and specialty, which is not obvious in Japan, India, and South Africa (Meelissen 2008: 386). That is why, in European schools, it is important to provide girls with computer competent female teachers using ICT for teaching languages, as role models.

The synthesis of characteristics contained in eTwinning projects, based on the theories presented above, can be formulated as follows:

- Educational reality is created by participants' activities through personal contacts and the design of digital objects.
- The digital media are an essential means of learning and means of communication for learning.
- A variety of discourses are incorporated, as there are various (not only teachers and learners) participants of the learning process.
- Verbal and pictorial means of communication are used, which convey equally valid to some extent, complementary – messages.

- Holistic learning with the emphasis on multi-tasking in performing activities prevails. Linguistic, intercultural, technical, entrepreneurial, social, and subject-related competences are acquired and practised in every task.
- Learners achieve more than is expected: for example, the main aim of starting an ICT contest with a foreign partner is to develop computer skills. To do it, learners communicate in the foreign language, negotiate in multicultural settings, and learn about the culture of their partners
- Co-operative rather than competitive attitudes to individuals and learning processes allows learners to develop at their own pace. This leads to individually appropriate time management. Co-operation changes power relations in the extended classroom by empowering learners and altering the responsibilities of teachers.
- Social contacts are the main source behind the motivation to learn.
- There is a margin for risk, error, and loss in an unknown situation on the learners and teachers' side. Mistakes and difficulties are triggers for reflection on learning and milestones in the learning process.

eTwinning: A Perspective Based on the Polish Experience

The policy context for eTwinning is the European programme for primary and secondary schools – in which over 71 000 schools participate, with over 96,000 teachers registered. A teacher, school administrator, or even a librarian who works in a kindergarten, or in primary or secondary education, may start a project in co-operation with a partner from another European country. There must be at least two partners. Other teachers may join – the maximum number is not limited. The framework proposed is very flexible – neither the theme, nor the duration of the project is pre-

scribed. However, it is assumed that project work will fit curriculum requirements. Therefore, the partners' responsibility is to negotiate and work out the topic, the procedures, time, deadlines, and expected results. National support services in each partner's country have to approve of the newly registered projects to ensure the safety and credibility of the institutions involved. The duration of the project may vary from one week to several years. Some digital tools for storing materials and communication are available in TwinSpace. However, the participants are encouraged to use any hardware and software tools available to them, which they find useful and productive to achieve the goals of the project. Participation in the programme does not require any financial burden. Teachers neither get any remuneration for their work, nor do they get any financial support, e.g. for materials. It is assumed that teachers use digital infrastructure and resources available in their schools and teaching contexts. Though this reduces the time spent on finances, at the same time it may hinder communication in the case of poor quality of the internet connection. eTwinning is perceived as one of the main e-learning educational programmes in Europe (Uzunboylu 2006). As constructivists claim, the educational reality has been created by social interventions of teachers and learners within an organisational and technological framework provided by the Central and National Support Service Agencies.

The purpose of this study is to observe, identify and describe the development of a new ICT-based learning environment on a large scale at primary and secondary levels. The focus of the study is to describe the characteristic features of the multinational learning environment and evaluate the results, as well as promote examples of good practice.

The research took place in Poland, a country which is a European leader – both in the number of projects registered and their quality; every year, a Polish project is awarded in a European contest. As Poland is also a relatively mono-cultural and

mono-lingual country, participation in the project is an occasion for students to learn in both a multilingual and multicultural environment. For many students, particularly those from rural areas, it is the only chance to experience intercultural contacts with peers, in a safe learning environment.

In Poland, over 5,700 projects have been set up by June 2010 involving over 10,000 teachers and hundreds of thousands of students. They work at all levels of education, from kindergarten, primary school, and secondary level to vocational secondary education, including school libraries. The majority of projects have been undertaken by language teachers, as they have easily perceived the opportunities for learners and themselves to develop linguistic, technical, and intercultural skills. The second largest group of teachers are those who teach information technology, for whom the use of technology in the learning environment is the basic aim of teaching. The next main group of teachers are those employed in kindergartens. They have adopted the ideas of international co-operation via technology to the learning needs and cognitive development of small children, who must be carefully supervised, whatever they do (c.f. Findings section of this article).

The naturalistic-ethnographic research has taken place during the 5 years since the beginning of the programme. In such a type of research the role of the researcher is often needed for understanding the context of the investigation and outcomes. The researcher worked as a participant observer, while serving as a national expert for the Polish National Agency of the programme. She was able to evaluate projects submitted for National Quality Labels (814 labels) and for National and European Awards. The study covers, evaluation of self-reflection by the teacher participants of their own work. She was also able to interview teacher co-ordinators of the best projects at National and European levels. She observed teacher participants of a 10-week distance-learning course titled "How to participate in the eTwinning programme?",

which she authored in 2006. The 9th edition of this course will start in September, 2010.

The research design is naturalistic and qualitative as the new learning environment has been observed *in statu nascendi*. The research instruments comprise in-class observation of selected projects' activities; content analysis of 814 descriptions of the projects and materials indicated, as their results were submitted for eTwinning National Quality Label between 2005 and 2010; 60 interviews with school teachers – participants of eTwinning programme, winners of awards – to provide extra information about their motives and beliefs. Collected data came from the annual reports of the National Support Service in Poland (Gajek 2005, 2006, 2007, Pietrzak 2009) and statistics provided by the Central Support Service of the eTwinning programme.

Findings

On the basis of the data available from the National Support Service portal we can see that the number of schools and teachers participating in the programme varies, depending on the size of the country, educational authority support, and the intensity of promotional campaigns of the National Support Services. The number of active projects shows the engagement of teachers and students in the programme.

The basic statistical data to show the distribution of projects in European schools is presented in Table 1.

There is no data showing the number of learners participating in eTwinning projects. However, it can be estimated that, on average, every teacher, participant of the programme, in Europe introduced eTwinning to 50 students. This makes nearly 5 million students engaged in the project activities. With this number in mind, it can be assumed that the reality of education has been

changed by the social interventions of young Europeans and their teachers.

Teachers of languages comprise the most active group in the Polish community of participants in the eTwinning programme (12%). The second largest group are the teachers of information technology and computer science (9%). Their activities account for nearly 50% of the total number of projects registered (Pietrzak 2009).

A number of subjects can be declared as relevant for a project. The actual distribution of subjects in eTwinning projects is presented in Table 2.

The Use of Languages

The main language of communication in the projects run with the participation of Polish schools, in 2009, was English (66%); the second most popular language was German (11,5%); followed by Polish (7%), and French (5%) (Pietrzak, 2009). English was declared as the main means of communication in 90% of the projects in Europe. However learners use other languages they know, or they develop plurilingual competence, for instance in Slovak-Polish project on information technology where English was the declared language of communication, and both teams used their own languages. Analysis of the materials shows that both partners prepared materials in their own native languages. In many projects, teachers declared all partner languages as languages of communication. In this way, learners have a chance to get to know some basic vocabulary in languages they would never learn without being involved in the eTwinning project.

Learning Vocabulary

As instance of this came the result of a project *Dictionary masters* (2006-2007), where a Polish-Danish-English picture dictionary was prepared.

Constructionism in Action within European eTwinning Projects

Table 1. Number of schools and teachers involved in European countries at 07.08.2010, and the number of active projects

	Schools	Teachers	Active projects
Austria	693	900	104
Belgium	1038	1439	165
Bulgaria	1347	1750	224
Croatia	150	200	35
Cyprus	334	496	78
Czech Republic	2286	3453	338
Denmark	908	1309	100
Estonia	647	1438	85
Finland	1135	1591	144
France	8329	10518	1117
Germany	3745	4937	605
Greece	2633	3086	416
Hungary	885	1107	102
Iceland	229	309	48
Ireland	604	701	76
Italy	5868	8094	915
Latvia	487	643	65
Lithuania	1173	1537	205
Luxembourg	76	107	14
Malta	294	738	45
Netherlands	1121	1816	180
Norway	742	1138	98
Poland	8171	10839	1290
Portugal	1440	2399	254
Romania	3741	5830	1015
Slovakia	1547	2370	211
Slovenia	402	596	87
Spain	6402	8336	913
Sweden	1515	2148	200
Turkey	6514	7208	907
United Kingdom	7773	9771	993
	72368	97046	11062

Polish and Danish learners aged 10-12 learnt basic vocabulary in English from the following themes: Colours and Clothes, School, Days of the Week, Months, Seasons, Family and House, Shopping, Weather. They shared their bilingual dictionaries

with partners making one trilingual dictionary. They added sound files with the words in their native languages, so that the partners would get acquainted with Danish and Polish respectively.

Table 2. Subjects declared as relevant in eTwinning projects (based on Pietrzak 2009)

Subject	Declared in the percentage of projects (%)	Subject	Declared in the percentage of projects (%)
Foreign Languages	68,88	Mathematics/Geometry	7,53
Computer Science/ICT	49,87	Primary school subjects	6,60
History	46,68	Economics	4,71
History of Culture	41,97	Technology	4,26
Geography	33,86	Natural Sciences	3,72
Arts	29,68	Special Education	3,06
Interdisciplinary subjects	27,74	Design and Technology	2,37
Languages and Literature	26,01	Biology	2,29
European studies	25,21	Pre-school subjects	2,26
Music	24,81	Health	2,21
Environmental Protection	22,90	Politics	0,98
Theatre	21,62	Physics	0,96
Citizenship	16,68	Psychology	0,96
Religion	13,86	Geology	0,72
Media Education	13,86	Chemistry	0,64
Ethics	12,21	Astronomy	0,61
Philosophy/Logics	11,01	Home Economics	0,56
Physical Education	10,53	Law	0,27
Social Sciences	9,73	Classical Languages (Latin/Greek)	0,21

Steps in Communication With Partners

Step 1: Getting to Know Each Other

Based on content analysis, some common features of the projects can be identified. In each eTwinning project, the first phase is the same – getting to know the partners. The participants introduce themselves, describe their class, school, region etc. with the use of technology. The means of communication depends on the technology used. The aims of this phase are largely fulfilled by means of written communication – such as email, chat or blog – whilst spoken communication is conducted through Skype or videoconferencing systems. Visual aids – such as photos and films – are widely used in PowerPoint presentations and blogs to

help fulfill the communicative aims of getting to know the partners and their learning environment. At this stage, students acquire and gain confidence in spoken and written language appropriate to the introductory and descriptive contexts.

Teachers interviewed reported greater motivation to learning a foreign language among learners participating in the projects, and a subsequent rise in interest in presenting and expressing oneself via own hobbies, describing of school and place of residence. Introducing oneself to peers and getting to know your partner is more meaningful in comparison with working with textbooks only. Having received introductory messages from their partners, students immediately search for similarities and differences. A teacher from a kindergarten reported that 4 year-olds immediately found Spanish peers who had similar names such

as Maria, David, and preferred contacts with them. As reported by the same teacher, making a snowman by the Polish children, and singing Polish and English songs about it, has become an essential point in contacts with their Spanish partners. The impact of eTwinning contacts on the children's perceptions is well illustrated by a critical event reported by the teacher. Spanish children knew that snow is cold, so when they got an interactive whiteboard for co-operation, which was mainly used for synchronised drawing of pictures together with their partners, they saw snow on the whiteboard, and approached it expecting the surface to be cold. Primary and secondary school students tend to ask their partners for clarification, if something is unusual for them. A teacher co-ordinator of a Polish-Greek project reported in 2009 a substantial increase in interest, as well as factual knowledge about Greece, in 20 teenage learners and herself. She had to collect information about Greece to participate in the dialogue with her students, and to explain cultural facts which were unusual for her students. She found it interesting and engaging, but she also perceived this as extra work, not normally assigned to an English teacher.

Step 2: Topic-Oriented Communication

The next phases depend on the topic and duration of the project. Contrary to the first step, in which the language used is very similar in every project, in this phase, the language depends on the content. Below, three main areas of interest are presented: namely language projects, maths and natural science projects and art and social science projects. Whereas a project may belong to several categories, this approach helps to focus attention on the leading theme of the project.

Language-oriented projects, most often undertaken by language teachers, cover topics within a broad sense of culture as there must be meaningful content for communication such as traditions, customs, festivals, cuisine, teenage

culture, lifestyles etc. Students either exchange information or prepare the end product together. They are able to learn and immediately use language related to the topic. In 2007, in the Polish-French-Italian project *Paint inspirations* (http://gorzow.internetdsl.pl//index.php?option=com_content&task=view&id=1&Itemid=12) students were presented every month to a masterpiece of European art. e.g. Chagall's "I and the village", Bruegel's "The tower of Babel" Delacroix's "Liberty leading the people". Each picture gave grounds for learning about the extended content of the picture, strictly related to the curriculum requirements for the group of upper secondary students. The language of communication was French. However, they also used English and Italian. As reported by the teacher co-ordinator, while working on the project themes and preparing materials together, the students learnt and made progress in languages, computer skills, various inter-related aspects of European culture presented in art, language, and literature. They acquainted confidence in intercultural contacts through technology, were able to participate in dialogs on culture in a foreign language. They identified and shared common values, and noticed differences accepting them with due respect.

It is worth noticing that topics oriented solely on language as a system such as learning the *Present Perfect tense* do not exist in the broad range of topics that have been undertaken so far.

In the projects with their main focus on art, media, architecture, nature, and social issues, which can be also perceived as part of culture, content-specific language is just a means of communication. Students negotiate meaning; interact in any way – they record songs or dances – their own or their partners'; write newspaper articles for a jointly edited e-journal; together adapt theatrical masterpieces and put them on stage. In the project "Dance and sing with us", audio and video recordings of songs and dances were exchanged between Polish and English schools. Learners aged 7-11 years, learnt how to sing and dance their

partners' songs and dances. The performances were recorded and sent back to the partners. The teacher co-ordinator reported increased interest in the partner's culture, raised cultural awareness of "us" and "others", preparing the ground for better intercultural understanding. The above example shows that the level of linguistic interaction can be limited in a successful project.

However in the majority of art projects, the activities require intensive communication, written or spoken. Group work with partners, and with colleagues in their own school helps to develop various language skills. Students write and speak in the target language – usually the main language of communication. They also learn the native language of their partners, to some extent. In a project with Polish and German partners, the official language of communication was English, but recorded written discussions show that students switched languages and interacted in German unofficially, when it was easier and more effective to do so. The project provides a fertile environment for practicing mediation skills, both in a foreign language and between languages. In the materials stored, there is an agreement with the project schedule written by the students, after a conference on Skype. The teacher co-ordinator reported that to prepare the document students had to recall the conversation with their partners and when necessary, the better students had to explain the negotiations to colleagues who did not fully understand the meaning. Mediation skills were also practised in tasks such as preparing reports, e.g. to colleagues from other classes during eTwinning weeks, presentations for parents and official visitors who came to school. One teacher reported that she took a group of her primary school students to a teacher training session at a school in the neighbourhood, to present the effects of their project, thereby mediating the content of the project to other teachers.

Projects with the main theme in mathematics, natural sciences and computer science are very interesting from the linguistic and cultural

points of view. Non-linguistic systems of communication such as mathematical notations, computer languages, and videos and photos of experimental tools and processes provide the means for co-operation. The language is used mainly for planning and reporting the results and for social interactions. It is a common custom in these projects, that students prepare multilingual content-oriented glossaries, usually with English as a common ground for communication and functional language of the participants. They develop multilingual and plurilingual competences in the area of their special interest. Furthermore, they can observe the international terms used in science and technology – as such terminology dominates especially in computer science. Students learn and use language that is rarely available in widely used textbooks for language learning. So, participation in such projects provides new opportunities for linguistic development – which would hardly appear in school setting previously. An example of good practice is a Polish-Romanian project *Art inspired by mathematics* (<http://www.lo5.sosnowiec.pl/art/?mainmenu=1>). The students learnt maths contextualized in art, paintings, and music. The teacher co-ordinator reported that participation in the project was the only chance for her students to learn mathematical terminology in English, and get acquainted with the terminology in Romanian. They were able to experience the presence and role of maths in paintings and music, which was a discovery of a lifetime for some of them, for after the years of schooling they perceived maths as boring and de-humanised. For her as a maths teacher, it was an opportunity to use English for professional purposes, while sharing her fascination for the beauty of maths, and the pleasure of teaching and learning it.

The Role of Gender in Using an ICT-based Environment for Learning

Gender aspects of eTwinning projects are worth mentioning. Communication via technology

makes digital tools attractive to girls and women because they see the social and human purpose of using them. Feminine values such as emphasis on social contacts, limited competitiveness, and lack of hierarchy characterize interactions in projects. That is why, women and girls willingly learn how to use new ICT-based means of communication, if this facilitates social contacts with partners abroad. All teachers interviewed, reported their own and students' progress in computer skills and increased confidence in using the ICT tools, while communicating with partners in eTwinning projects, because technology is used in a feminine way. Four teacher prizewinners of national awards were interviewed on the gender issue. A teacher, who works in a kindergarten, observed that there was no difference in approach to technology between genders. In addition, she as a competent computer user was perceived as a role model by the girls. A teacher from the primary school, also noticed a similar approach to computers by boys and girls. A teacher, who works in a lower-secondary school witnessed a differentiation in interests. She saw that boys had more fun by simply using computers, whilst girls did what is assigned, but they did not find anything special in computer work. The same tendency was observed by an upper-secondary teacher. Even though the girls in her class performed better at computer-based assignments, they treated them as a typical school assignment – nothing to get fascinated about.

For boys, who are most often attracted by digital tools and gadgets, the possibility to experiment with new tools motivates them to develop skills perceived as less attractive, namely social skills: verbal and visual communication with peers via technology. Even underachieving boys can find the use of technology a real and highly motivating means for learning a foreign language, as they develop receptive and productive language skills for meaningful communication with peers abroad. A teacher co-ordinator reported that she observed an explosion in motivation to learn English, after

a video conference on Skype, which her class – a vocational school for builders – had with a similar class from Italy. The boys, who were not quite willing to learn the language before the conference, sometimes having had previous bad learning experiences, realised that their colleagues from the Italian school were similar to them, and the basic English language they possessed was enough to understand and be understood. In the following months they worked hard to learn English, if only to express themselves in the forthcoming video conferences.

Building a Multilingual and Multicultural Learning Environment

Even though more and more schools have become multilingual and multicultural, there are still local communities in which learners do not have any face-to-face contact with languages and cultures other than their own. Participation in the project gives them a unique chance to use the foreign language, they learn, for contacts with peers from a partner school. They experience multilingual and multicultural co-operation on equal terms which provides an additional dimension of openness over the geographical and social limitations. A teacher co-ordinator of a project undertaken by a small village school in the center of Poland reported that the ability to contact with learners from a school situated in a rural area in Great Britain increased motivation to learning English, gave a sense of achievement and hope for success in the future, as well as better understanding the potential of ICT in individual and social development. The learners and the school community as media promoted the project experienced the sense of belonging to a wider multilingual and multicultural community.

Developing Intercultural Skills

Participation in a project provides a sound environment for developing intercultural skills. They are acquired in practice, through learning by doing.

Students from an early age acquire the necessary intercultural skills, how to observe, interpret and react in situations which convey different cultural messages. One teacher reported that Polish learners were nearly shocked when asked by their German peers for their blood group types as this information is treated as private in Poland. They asked and got an explanation that it is something like the colour of the eyes. They learnt how to react quietly and politely in situations perceived as unusual in their own culture. In all projects, the students get to know the proper language for intercultural contacts, that either prevents conflict or helps to reduce it. Students learn how to observe and interpret the cultural grounds defined by Hofstede, that is power distance, individualism, masculinity uncertainty avoidance and long-term orientation in contacts with foreign partners.

The Use of Photos and Videos for Communication

The role of pictures – still pictures and video – as a means of communication is essential in projects. The need for successful communication triggers students' creativity. To make a video comprehensible, they add subtitles, with translation of the original soundtrack in another language. To explain the content of a series of photographs, they add a soundtrack with recorded text of a story. For the partner, a picture conveys more cultural content than verbal description. The pictures and videos become stimuli for conversations and negotiations of meaning, and thus the motivation for learning languages, technology and cultures grows.

Language of Communication Between Generations

Although project work is well embedded in the curriculum and relates strictly to its requirements, extended school communities often get involved in it. In projects with historical themes students often interview their parents or grandparents. In

the project *Respect and remember* Polish and British partners reflected on the Second World War in their regions. They collected photos, interviewed older family members, and invited a veteran, who became a friend of the school. This ensured that contacts between generations got closer. The teacher co-ordinator reported that the responses of the students on both sides exceeded the teachers' expectations. They were engaged in the presentation to their partners what the historical facts really meant for them, which was a sound ground for authentic communication and negotiation of meaning apart from developing intercultural and linguistic skills.

Margin for Being Wrong

In the outlined environment, both students and teachers from the partner schools acquire various skills. Teachers can also learn from their foreign partners and the students. They all can make mistakes. The feedback is immediate and meaningful, so a mistake or misuse of digital tools, language or intercultural misunderstandings in international contacts, helps to acquire consciously or subconsciously, various skills and competences. Teachers reported that dealing with their own and students' mistakes was hard. Nevertheless, the harder the problem, the more fun they had when it was solved. Effective use of time was focused on the goal, successful communication and results of the project.

Ground for Communicative Approaches

International projects are well suited for implementation of the communicative approach to language learning, because the language of the project is usually the only means of communication between partners. Artificial attempts and techniques recommended within this approach are replaced by authentic contacts and communication tailored to the needs and potential of the learners.

The fact that contacts with partners take place via technology does not hinder communication. On the contrary, they make it more attractive – and ultimately, more motivating for learning.

Teacher Lifelong Learning

Teacher learning – more regularly formed in-service professional development, takes place in eTwinning projects. Teachers get access to the teaching environment of their partners. They get to know pedagogical grounds and teaching practice applied in other educational systems. They co-operate, solve problems, learn from each other, and from the learners.

The majority of teacher participants of eTwinning projects, who have been interviewed, have presented positive attitudes to change and innovation. They are ready to experiment and take risks. They creatively explore the learning environment which is available to them. Having finished one project, they immediately start the next one. In the 5th anniversary of eTwinning publication nine of the teachers who have completed at least five projects awarded the National Quality Label were selected and their projects were highlighted as examples of good practice (Raińska-Nowak 2009). However the mainstream does not present such high levels of acceptance of novelty. They find project work as time consuming and not relevant to the needs of learners – especially those concerned with preparation for exams. They also need to get used to time management and responsibilities, in co-operation with partners via technology. As they report in evaluation sheets at the end of the online course, they need support from more experienced participants of the programme.

CONCLUSION

The students and teachers' work exemplifies the constructionist approach to learning in general as, all of the eight big ideas of constructionism are

present in all projects. The eTwinning programme can also be perceived as a constructionist approach to in-service teacher education, as solving problems is shared and teachers learn from their foreign partners, and from learners.

To sum it up step-by-step: learning takes place while students are active – they learn by doing (big idea no 1). They use technology available and search for more – the use of technology is essential for communication and learning the language used in natural multicultural contexts (idea no 2). All participants perceive participation in eTwinning projects as *hard fun* – because they have to be open to new challenges and overcome their limitations, whilst learning what they need, which would be unlikely without the project activities (idea no 3). Students and teachers work in teams to solve problems they face: linguistic, technical, intercultural, subject related – teachers provide examples of how they learn themselves which seems to be beneficial for learners (idea no 4). The flexible framework of the projects allows enough time for tackling the issues undertaken. Time and schedule can be kept under control – but there is no time pressure except the deadlines accepted by the partners (idea no 5). Students and teachers can learn from their own mistakes (idea no 6); failures allow for the searching of new perspectives and solutions. Teachers practise what they teach. They usually do not know the final result of the project – what exceeds the plan and what gets behind. Learning is shared – teachers may learn from learners (idea no 7). Technology is not an end in itself. It is used for helping the learning of other things such as language, culture, maths and science (idea no 8).

The collaborative and integrative approaches to learning: language, technology, subject knowledge and skills in an international and multicultural environment, support the introduction and advantages of e-learning without losing the benefits of face-to-face learning. A feminine approach to technology allows for flexibility, manageability

and practicality of the programme. It shows the direction for education of the future.

The flexible framework of the programme extends the learning environment in the geographical, cultural, linguistic and local sense. It creates a learning society, including families of students and teachers, and encourages multi-directional learning so that teachers may also learn from students without losing authority. The strength of the programme is that the technology is used in an innovative environment which is neither manipulated nor imposed on schools and teachers.

Limitations of the Study

The research was based on the analysis of descriptions and materials of the projects submitted for the eTwinning National Quality Label and interviews with prize winners at National and International eTwinning contests. Hence, it presents the success stories. In the projects investigated the teachers and learners made use of all the constructionist ideas. In this study there was no access to projects which were not completed, to circumstances which hindered the development of a project. Therefore the picture of the learning environment might not be complete. However, at this stage of development of the programme and the eTwinning community it seems essential to present examples of good practice with theoretical support rather than investigate obstacles, which would probably be the next step in investigation the learning environment.

Another limitation is related to the position of the researcher whose role was to observe the environment without any intervention. This produced subjective and descriptive findings; making it impossible to present hard data, e.g. that in this international ICT-based environment, a fixed number of students learned a fixed number of words or used a selected communication strategy x-times. The descriptive character reflects the qualitative not quantitative type of the investigation, as the focus was to observe the learning environment

created by the community of teachers, learners and support service managers *in statu nascendi*.

However, within the Papertian theoretical framework proposed – especially constructionist big idea no 6 – the limitations presented above can be perceived as steps for future development.

RECOMMENDATIONS

Although educational authorities in most countries support schools that participate in the eTwinning programme, many schools still do not have access to technology, which makes visual and audio communication user-friendly. Making access to constantly updated technology available for teachers and students is, therefore the primary recommendation.

Teacher professional development programmes do indeed require more emphasis on the use of technology in teaching – particularly in international contexts, via communication through digital media (cf. Koenraad 2005, 2007).

Participation in the programme is voluntary for teachers. The pioneers duly got involved immediately when it was launched – the challenge now is to embrace the mainstream. There is a risk that formal requirements to participate in international projects may bring more harm than benefit. So, the process of introducing change has to embrace a variety of factors (Lamie 2005).

For accountability reasons assessment methods and techniques in high stake exams should be adapted to the international learning environment. Teacher and school evaluation procedures should include the use of technology and participation in international projects.

FUTURE RESEARCH DIRECTIONS

Digital media create a new learning environment. The role of media, information and communication technologies in learning and teaching, will

increase in the future. Consequently, there is a need for research on the influence of media and ICT on learning languages, in individual and social aspects.

The trend emerging from the educational reality, created by the participants of eTwinning projects, indicates that, learning in international teams fulfils the theoretical assumptions coming from various areas of education. In addition to this, the organisational framework proposed fulfils expectations of the teachers. Therefore, it is necessary to investigate the processes – their effectiveness to find optimal settings for learning.

The spontaneous and autonomous processes in schools, supported by the eTwinning framework, need to reach a plateau stage, a measure of stability to make research of the principles and regularities of the learning environment possible.

New ways of communication, with a combination of picture accompanied by soundtrack and subtitles in two different languages, urgently need thorough investigation. While watching a video, for example – prepared by their partners – learners are exposed to the picture, which is more likely to be understood, plus sound, they may understand or not, as well as subtitles in another language. In summary, they use visual channels for getting information from the picture, and subtitles and auditory channels for getting the information spoken in another language. The key question is: how do they infer meaning, when they are at different levels of language proficiency in the two languages, aided by some contextual clues from the picture.

CONCLUSION

The new learning environment, which has been created within the eTwinning programme, and meets the expectations of practitioners and fulfils the assumptions of theoreticians, can be perceived as one of the main trends in education. Although participation in it is voluntary, with no remunera-

tion, it attracted thousands of teachers from all over Europe and beyond. The approaches to teaching and learning they implement on an everyday basis are well grounded in the theories developed in pedagogy, such as constructionism, especially in language learning methodology. Policy-making declarations support the approach implemented in the programme. The growing role of the media, information and communication technologies – not only as a tool in language learning but also a form of communication in learning and teaching contexts, clearly emerges from the learning environment. Meanwhile, processes that enhance and support learning languages in international teams have to be further investigated to find optimally effective settings for learning languages.

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KEY TERMS AND DEFINITIONS

Collaborative Language Learning: a method of learning a language in which a student learns a language in collaboration with others – usually peers.

Constructionism: a theoretical approach to learning based on Piagetian constructivism, introduced by Seymour Papert. It assumes that learners create individually mental models to understand the world while manipulating tangible objects – preferably digital ones.

Constructivism: a theory which claims that learners create inner mental models to acquire knowledge about the world. There are two branches of constructionism – social (rooted in Vygotsky's pedagogical ideas) and cognitive (referring to Piaget's pedagogical work).

Content-Based Language Learning: a method of learning a language in which a student's attention is focused on the content.

eTwinning Programme: educational action launched in 2004 by the European Commission to facilitate contact between schools through digital media.

Project-Based Language Learning: a method of learning a language in which a student has to perform a sequence of activities to produce a visible product.

Task-Based Language Learning: a method of learning a language in which a student performs meaningful tasks.

Chapter 7

Performance and Anxiety in Videoconferencing

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ABSTRACT

Anxiety has long been considered a hindrance to both language learning and performance. To address this issue in oral language testing, it has been suggested that the use of Information & Communication Technologies (ICT) to distance the test-taker from the interviewer could reduce anxiety levels and, thus, improve performance. Research has been undertaken on the use of synchronous and asynchronous text chat to lower anxiety and increase communication. However, research on the use of videoconferencing is largely unknown in the same areas. Thus, this study undertakes the challenge by comparing forty students' anxiety levels when they took an oral test face-to-face and via an online videoconferencing medium. The students were from a private, mid-sized, Korean university, and they were interviewed and rated by two interviewers under both face-to-face and video conference conditions, as well as surveyed for state anxiety. The findings in this study will be used to guide the design of future distance assessment instruments as well as inform educational research in this field.

INTRODUCTION

Videoconferencing began long ago (Andberg, 2008), but only now are we seeing signs of real growth in its use (Edigo, 1988). While costs have consistently gone down, technologies have

improved. High speed data transmission has become more affordable and widely available, and improvements in compression technologies have provided higher-quality audio and video at lower bit rates. Korea, with over 95% broadband penetration is consistently at or near the top of international Internet access and speed surveys (“South Korea tops in broadband penetration:

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Study,” 2009, June 18). Computers and cameras have also improved while coming down in price. Inexpensive laptop computers equipped with integrated webcams capable of videoconferencing out the box can be found for a few hundred dollars, not to mention a new generation of mobile phones equipped with videoconferencing capabilities. Lastly, low-cost and free services, such as Skype, MSN Messenger, and Google Talk, have provided the software necessary for one-on-one desktop videoconferencing, while others, such as Adobe Connect Pro™ and Elluminate (Karabulut & Correia, 2008), provide more robust multipoint videoconferencing solutions for organizations.

The lowering of technical and price barriers in videoconferencing technology has led language educators and learners to begin to take advantage of the great potential of desktop videoconferencing. A number of businesses ranging from language learning-based social networks (e.g., LiveMocha and italki) to tutoring businesses (e.g., PhraseBase and eduFire) have been built around this technology. With the growing interest in teaching and learning online using videoconferencing technologies, there is also a growing interest in assessing learner performance in these spaces. The use of videoconferencing for interviewing in a foreign language context is often difficult and expensive given a lack of access to qualified interviewers and raters. Videoconferencing allows testers to connect interviewers and interviewees any place in the world for an interview experience. However, while cost and convenience may be alluring, care must be exercised when utilizing new technologies, especially when used for testing.

Language testing in online environments is a new and exciting area of research. Issues of test validity when moving from a face-to-face to Internet-based test environments are essential to evaluate. This is particularly true when testing oral communication via videoconferencing technologies. Testers must establish that a test is measuring that which it intends to measure rather than extraneous variables. Practical, technical,

and affective factors can each make for a difficult transition to this mode. Of particular interest are both the effect on and role of affective variables in videoconferenced language testing. Anxiety is one of these affective variables shown to play a role in language learning and test performance, and it is of a particular concern with English language learners in Korea, where this study took place. A central question is whether the role of anxiety differs when conducting interviews in these two mediums.

The intent of this study was to investigate the relationship between mode, face-to-face or videoconferenced, and anxiety and the relationship between anxiety and performance on oral interviews with Korean learners of English in Korea. This chapter will begin with a focus on the roles of videoconferencing anxiety on performance. Then a detailed description of the development and implementation of an online interview test will be provided. A discussion of the results and implications for language instruction and testing will then be presented.

BACKGROUND

Videoconferencing and Foreign Language Learning

The use of videoconferencing is not merely seen as a new technological toy for the classroom, but rather as potentially beneficial for learning (Fetterman, 1996; Wang, 2004). Not only does videoconferencing enable learners to access vocal and facial cues that they miss out on in text communication (Wainfan & Davis, 2004), but the ability to see and hear the person you are communicating with increases the sense of social presence (Edigo, 1988) that learners feel. The addition of video to distance education programs not only provides the ability to process non-verbal cues, but also to feel a more immediate connection to those you are communicating with. These are both

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seen as important for successful communication; though, there is little agreement on their overall effect (Gruba, 1997; Wainfan & Davis, 2004).

Unfortunately, the use of videoconferencing in education has not been the subject of much research (Xiao, 2007). Much of the educational research has focused on describing classroom exchanges with remote speakers and classrooms, and distance tutoring, with a large number of project reviews on the use of videoconferencing systems (Lee, 2007). However, there is a small, yet growing body of research on the use of videoconferencing for communication and evaluation.

Many studies on videoconferencing establish that users are satisfied with the systems being used. Some report on the fitness of the technology for interviewing (Kroeck & Magnusen, 1997) and rater training (Cheong, Ng, & Toh, 2007), and other report its use for small scale studies (Xiao, 2007) or even large scale university implementations (Byrne & Staehr, 2002). One has to question, though, what is meant by satisfied. Much of this satisfaction is derived from the ability to access those whom they would normally not have access to, whether employers, professors, or simply native speakers of a language being learned.

However, a more important question for this study is whether there is any performance difference in videoconferenced interactions. In a study similar to our own in design, the Defense Language Institute Foreign Language Center (DLIFLC) looked at the use of videoconferencing for testing. Clark & Hooshmand (1992) described how the DLIFLC compared the use of videoconferenced and face-to-face interviews to assess language proficiency with 32 Arabic and 32 Russian language learners. Important findings indicated that there was no significant difference on performance. However, the technology used was inferior in terms of audio and video quality to the system used in this study, which likely impacted outcomes. They reported gaps in audio as long as two seconds, and the video was pixilated when either participant moved.

Reports of no significant difference between face-to-face and videoconferenced performance is not surprising. Though some studies report increased academic achievement (Cavanaugh, 2001) and even language performance gains (Xiao, 2007) with videoconferencing, the majority of research comparing the effects of media on learning suggest that there is no significant difference (Clark, 1983, 1994). The general consensus has been that media does not affect learning, but attributes of media may. Therefore, we did not expect a significant difference between performance in face-to-face interviews and videoconferenced interviews in this study, given the prior research.

The question, therefore, was not whether mode directly influenced performance, but if it influenced other variables that, in turn, affect performance. The aim of this study was not to determine whether videoconferenced interviews resulted better performance than face-to-face interviews, but rather how test-takers responded to those interviews. How test-takers feel before, during, and after a test can tell us much about them and the overall testing experience. This study is specifically interested in the role that anxiety plays in test performance and whether test mode influences these feelings.

While there are no studies specifically on anxiety in videoconferenced testing, there are some that suggest the use of online audio and videoconferencing do reduce anxiety in some contexts. Anonymity in audioconferencing contexts has been shown to lower anxiety in mixed-groups (Yu, 2003) and in female students participating in online university courses (Sullivan, 2002). However, anonymity does not seem to be an essential factor in the lowering of anxiety in audioconferencing. Another study with 35 university students in Intermediate Spanish classes were surveyed (Poza, 2005). All were using an asynchronous audio discussion forum as well as participating in face-to-face residential classes. Findings indicated that use of the audio discussion forum lowered anxiety, they were more empowered to take risks,

and they were not as concerned about evaluation as in their face-to-face classes.

The above studies might suggest that some of the benefit in regards to lowering anxiety is in the audio-only nature of communications. It is possible that avoiding the gaze of another puts learners at ease. At least two studies suggest that a reduction in anxiety can also be attributed to videoconferenced interactions as well. In a study with 18 university students learning Spanish, Lee (2007) found that outgoing students were enthusiastic about interacting with native Spanish-speaking instructors through videoconferencing, but this same experience provoked anxiety in shy students. Unfortunately, in this study, there is no way to tease out the impact of the medium versus speaking in the foreign language to native speaking instructors. Xiao (2007), in a dissertation comparing videoconferenced instruction to face-to-face instruction in 20 language learner-native speaker dyads, found that participants felt that the videoconferencing environment was more comfortable and non-threatening than the face-to-face environment.

The available research does not provide strong evidence that computer-mediated communication (CMC), including videoconferencing, impacts anxiety but they do suggest that videoconferencing may have some role in the reduction of anxiety in language learning contexts. To better understand how anxiety can impact language learners and situate our understanding of the nature of anxiety, the next section describes the role of anxiety in language learning and performance.

The Relationship Between Anxiety, Language Learning, and Performance

Anxiety is a feeling that we can all identify with, and thus, there has been a great deal of interest in it from the perspective of language learning, performance, and assessment. This study looks at the role anxiety plays in oral interviews face-

to-face and videoconferenced from the perspectives of both feelings that the tests elicit and the performance that accompanies.

Krashen popularized the concept of an “affective filter” in the process of language learning (Krashen, 1982). As part of his Monitor Theory, the affective filter acts against the acquisition of language by blocking the deep processing of input. “The foreign/second language learner’s affective filter is a psychological construct consisting of a set of affective factors which make the learner screen incoming TL [target language] information either consciously, or unconsciously” (Laine, 1988, p. 13). Though much of the Monitor Theory has been thoroughly criticized (Gregg, 1984), the concept of an affective filter in learning has received little. The metaphor of a filter is quite apt. This theorized construct does not stop input from getting through, but instead regulates how much or the quality of the input going through to the language acquisition device (LAD) (Laine, 1988). Therefore, it behooves language educators to help learners to open up this filter as much as possible for optimal input processing.

Though there is evidence that there may be a threshold for facilitative anxiety (Alpert & Haber, 1960; Tobias, 1985) which may actually improve or at least not lower performance, anxiety is usually considered to hurt performance. Anxiety’s impact on performance is well documented. Regardless of when anxiety is stimulated during a learning activity, it will harm performance (MacIntyre & Gardner, 1994). Those who have high anxiety have lower self-perception and academic achievement (Bailey, Onwuegbuzie, & Daley, 2000; Culler & Holahan, 1980) and language learners even rate their proficiency lower (MacIntyre, Noels, & Clement, 1997). In a meta-analysis of 562 studies, Hembree (Hembree, 1988) found a strong inverse relationship between test anxiety and performance in age groups from the third grade and above, particularly when tests were perceived as difficult.

While there was a great interest in anxiety in learning, some questioned whether a different

measure was necessary for analyzing anxiety in foreign language learners. Horwitz (1986) created the Foreign Language Classroom Anxiety Scale (FLCAS) to assess anxiety that haunts language learning classrooms. Foreign language learning anxiety is a form of situated anxiety referred to as a “specific anxiety” (Horwitz, 2001; see also Zohar, 1998), which is a relatively stable reaction to a specific situation much like test anxiety. Horwitz establishes that specific anxieties negatively affect performance on: vocabulary recall (MacIntyre & Gardner, 1989), final grades (Aida, 1994; Coulombe, 2000; Kim, 1998; Saito & Samimy, 1996), student and teacher perceptions of performance (MacIntyre, et al., 1997; Trylong, 1987), recall of text (Oh, 1990), and listening (Kim, 2000). The FLCAS consists of measures for communication apprehension, test anxiety, and fear of negative evaluation.

The FLCAS and similar measures have been used in a large number of studies with Korean learners of a foreign language. Of special concern for this study is that Korean learners have been found to have higher anxiety (Truitt, 1995), which Truitt suggests is, at least in part, culturally determined. This is further supported by Bodas and Ollendick (2005) who suggest that high stakes testing and educational outcomes and feelings of personal and familial shame and disgrace may cause high levels of test anxiety. The oppressive role of high stakes testing in Korea and high familial expectations in Korea form a recipe for anxiety.

Findings in the literature documenting Korean students’ high levels of anxiety are numerous. Schwarzer and Kim (1984), in a comparison of student scores on the Test Anxiety Inventory, found that Korean students were found to score higher than students from other countries. These high scores were suggested to result from high stress familial expectations and educational systems. Sharma and Sud (1990) conducted a cross-cultural analysis using multiple studies on test anxiety. 7,679 high school, middle class, urban students

from four Asian countries and five European and American countries were compared on their scores on the test anxiety measures. Korean students ranked highest in terms of general test anxiety. Lastly, 275 EAP students in Australia were assessed on their performance on an oral test, anxiety test, and interviews (Woodrow, 2006). The researcher’s findings suggest that Confucian Heritage Culture students (China, Korea, & Japan) were more anxious than students from other backgrounds and anxiety hurt performance on an oral test. Given these findings, the role that anxiety plays with Korean learners of English should be considered in any research on language learning and language testing in Korea.

However, in order to best understand the role that anxiety places in oral interviews, foreign language anxiety measures, like the FLCAS, may not provide all the information that is needed. Both test anxiety and foreign language classroom anxiety are types of anxiety that are relatively fixed, stable. These are considered types of trait anxieties. Trait anxiety is “a generalized and enduring predisposition to react to many situations in a consistent manner” (Endler & Kocovski, 2001, p. 233). State anxiety, on the other hand, is one’s reaction to an anxiety-provoking situation. Rather than rely on the FLCAS to tell us how the participants normally felt, we wanted a measure that better informed us of anxiety as experienced. It was important to better understand what the test-takers were feeling at the moments in time before, during, and after the interview, primarily that sense of nervousness (or lack thereof) that is a facet of state anxiety. Therefore, we prepared and administered a short, six-question survey to measure what participants were feeling at these times, from feelings of anxiety about the test to levels of comfort with the interviews, raters, and formats.

Research Questions

The literature review establishes five elements that are particularly important for understanding the current study. First, videoconferencing has developed sufficiently to be considered a viable medium for conducting language classes and testing. Second, videoconferenced testing does not result in significant differences in performance versus face-to-face testing. Third, participation in videoconferenced interactions may be less anxiety provoking than face-to-face interactions. Fourth, anxiety is likely to impact performance negatively. Fifth, Korean learners tend to exhibit higher anxiety than language learners in other countries. These are our foundational assumptions.

With those assumptions in mind, this study set out to investigate the relationship between mode, face-to-face and videoconferenced, and anxiety and the relationship between anxiety and test performance with Korean learners of English. Thus, the research questions for this study were:

1. Is there a relationship between mode (face-to-face or videoconferenced) and anxiety levels in an oral interview test with Korean learners of English?
2. Is there a relationship between anxiety and performance on an oral interview test with Korean learners of English?

METHODOLOGY

Participants

Forty English language learners from a university in Daejeon, Korea participated in the study in fall 2008. All participants were native Korean-language speakers, except for one native speaker of Chinese. Thirty-two were female and eight male. Twenty-four were freshmen; ten sophomores; three juniors; and three seniors. Their ages ranged

from 19 to 38, average age was 21.85 (SD=3.90). Their majors were: 35 English related majors, three tourism, one music, and one early childhood education. All participants were intermediate-level English speakers inferred by direct interactions and TOEIC scores all of which were less than 700 on the paper-based test. Specific scores were not provided.

Two native English-speaking interviewers, one male and one female, participated in the study. The interviewers both had MA degrees in the field of TESOL, and each had been teaching English for over ten years. They were well trained and experienced in interviewing test-takers in oral tests. They interviewed the forty students in both face-to-face and online videoconferenced interviews.

Instruments

Test Development and Design

To assess the participants' English oral proficiency, the researchers developed two forms of oral interview. One form was a face-to-face interview and the other was an online videoconferenced interview. The tests were composed of warm-up questions, directions, main questions, and wrap-up statements. The Warm-up questions were included to relax the participants and to accustom them to the interview environment. Two simple recall questions were developed: "How are you today?" and "How's the weather today?" For the main questions, one set of questions was developed for each mode (face-to-face and videoconferenced), and three questions were assigned for each interview. The topics and contexts were about college life and friends. These were chosen to reflect the purpose of the test: a speaking test for Korean college students. These are questions that do not require additional background information to answer and are likely to be accessible for the participants. Finally, the interview ended with Wrap-up statements. These statements consisted

Table 1. Oral interview questions for the face-to-face and online videoconferenced interviews

Warm-up Questions	“How are you today? How’s the weather today?”
Main Questions Face-to-Face Interview	Directions: Let’s talk about your college life. Please answer me as best as you can. 1. How do you like your college life? 2. How many courses are you taking this semester? Which courses are you taking now? 3. Which courses do you like the most? Which courses do you like the least? Why?
Main Questions Videoconferenced Interview	Directions: Let’s talk about your friends. Please answer me as best as you can. 1. Do you have many friends? 2. Do you think you need a best friend? Why? 3. Do you think having many friends is helpful for your life? Why?
Wrap-up	You did great job. Thank you very much.”

of expressions of gratitude and compliments on the participant’s performance. This was done to encourage the test-takers and leave them feeling good about their participation. The interviews last from five to ten minutes (see also table 1).

The participants were randomly divided into two groups. Each group participated in a face-to-face oral interview and an online videoconferenced oral interview a month apart. Two native speakers of English interviewed them for five to ten minutes and recorded their performance. The face-to-face interview was videotaped with a camcorder and the online videoconference was recorded by means of Adobe Connect Pro™, virtual classroom software. The one-to-one online interview was simultaneously carried out between the interviewer and the participants via webcams and microphones.

Computer Technology for the Online Videoconferenced Interview

Setting up computer technologies was one of the most important factors to administer the online videoconferencing. For the face-to-face interview, the interviewers needed to be familiar with the interview questions and test administration procedures, but the online videoconferenced interview required special computer technology. The researchers obtained access to an institutional implementation of Adobe Connect Pro™,

a full-featured enterprise conferencing solution (Karabulut & Correia, 2008). The audio and video quality was very good, the layout of two video windows next to each other was ideal for our use.

The interviewers were provided an online meeting space, and they set up their own cameras and microphones, while the test-takers used computers in private offices that had been set up for their use ahead of the interview. The interviews were recorded and archived on a server hosting the Adobe Connect program. Figure 2 shows the interview screen of the Adobe Connect Pro as it appeared to both participants.

Survey Development

For this study, a measure of immediate (state) anxiety was required to better understand the test-takers experience. A series of questions were included to assess feelings of anxiety before and after the interview, as well as levels of comfort during the interview. The rating scale was from 1 the lowest to 6 the highest. For questions 1 and 2, scale 1 was the most comfortable while scale 6 the most nervous. For questions 3, 4, 5, and 6, the anxiety levels were opposite: scale 1 the most uncomfortable, scale 6 the most comfortable. The survey questions were translated into Korean and given to the test-takers. The questions in table 2 were selected to be statistically analyzed.

Figure 1. Face-to-face interview



Data Collection Procedure

Procedure for the Face-to-Face Interview

The face-to-face interview was done a month earlier than the online interview. Forty students voluntarily signed up for the interviews and were divided into two groups. Each group was assigned to a rater and two interviews were simultaneously

carried out. It was a cross-design and the equivalence of the raters would be examined later based on the rating results.

The interview was a one-on-one, face-to-face form. As soon as the test-taker entered the room, the interviewer gave the instructions to her/him. Following the test administration procedure, the interviewer asked the test-taker warm-up questions and guided her/him into a conversation. The interview was videotaped by a camcorder, but only the test-taker was recorded in this case. Figure 1 is a snapshot from the face-to-face oral interview video. The interview took five to ten minutes in total.

Procedure for the Online Videoconferenced Interview

The online videoconferenced interview followed a similar procedure as the face-to-face interview. Two groups of test-takers took the oral test with

Figure 2. Videoconferenced interview



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Table 2. Survey questions on test nervousness

Test Nervousness	Not Nervous ←→ Very Nervous
1. How nervous did you feel before the test began?	1 2 3 4 5 6
2. How nervous did you feel after the test was completed?	1 2 3 4 5 6
Test Conditions	Not Comfortable ←→ Very Comfortable
3. How comfortable did the interviewer make you?	1 2 3 4 5 6
4. How comfortable was the testing environment?	1 2 3 4 5 6
5. How comfortable were you with this kind of speaking test?	1 2 3 4 5 6
6. How comfortable were you with the interviewer's pronunciation?	1 2 3 4 5 6

the two interviewers. However, each group was assessed by a different than in the previous face-to-face interview. In other words, those who met with interviewer 1 face-to-face met with interviewer 2 in the videoconferenced interview. The test administrator set up Adobe Connect, webcams, and headsets previous to the arrival of the test-takers. The test-taker sat down and began a conversation with the interviewer without the need to adjust computer or camera settings. Interviews lasted five to ten minutes in total. Figure 2 is a screenshot of a sample interview in Adobe Connect.

Survey Administration

A survey was administered, which measured feelings of anxiety before and after the interview, as well as levels of comfort during the interview. Additionally, participants were asked to provide any other comments that they had about the interview process. This was included at the end of the survey as an optional, open question. The purpose of this question was to provide insight to the researchers on the participants experience with the interviews. After each interview, each participant was asked to fill out this anxiety survey.

Rating

The two interviewers also served as raters. For each participant, the two raters analytically rated each speech sample and assigned a holistic “over-

all” score roughly based on the analytic scoring guidelines (see Table 3 below). The researchers developed the scoring guideline based on Kim’s (2006) speaking test, which refers to the ACTFL Speaking Guidelines (Language Testing International, 2004). Table 3 describes the scoring features and their descriptors: fluency, functional competence, accuracy, coherence, and interactivity. The features are the constructs that the oral interview is intended to measure. Their descriptors are the expectations of the test-takers’ English speaking proficiency. The rating scale was from 2 the lowest to 6 the highest. The scales are 2, 3, 4, 5, and 6.

Analysis

All data were collected, including test scores for both interview forms and the results of the participants’ anxiety surveys. Both performance scores for each scoring feature and an overall score were analyzed in order to better understand performance as a whole and its constituent parts. The test and survey results were analyzed using SPSS 15.0, a statistical analysis tool. The mean differences of test-takers’ performance between the modes and their anxiety and comfort levels between the modes were analyzed with paired sample t-test. Additionally, the relationship between the anxiety level differences and their performances according to the different test forms was analyzed using correlation coefficients.

Table 3. Scoring features and descriptors

Feature	Descriptors
Fluency	The speaker's natural flowing speech including hesitation, repetition, re-structuring, inappropriate words and sentences
Functional competence	The speaker's ability to select functions to reasonably address the task and to select the language needed to carry out the function
Accuracy	The speaker's appropriateness of pronunciation, grammar, and vocabulary in academic settings
Coherence	The speaker's clear and logical organization of his/her utterances in academic settings
Interactive-ness	The speaker's speech structure, its sequential organization and turn-taking rules, sometimes including strategies in one-way or two-way communications in academic settings (for Face-to-Face Interview)

RESULTS

Test-Takers' Performances Between the Modes

There was high reliability between interviewers overall ($\alpha=.84$) while the correlation between the two was .69, $p=.000$. There was no interviewer effect in the test so the test scores according to the interviewers could be aggregated into the raters.

There was high reliability between the raters ($\alpha=.83$) and the correlation coefficient between rater 1 and rater 2 was .68 ($p=.000 < .01$). The coefficient index indicated that the scoring results of the two different raters were significantly correlated. That is, there was no rater effect on the scoring.

Means and standard deviations of the two interviews and the overall scores are presented in Table 4. The correlation coefficient between face-to-face and online interview was .66, $p=.000$. The two modes are significantly correlated. To compare the mean difference between the modes, paired sample t -test was employed. The statistical results showed that there was no significant difference in participants' performance between the modes: $t(39)=.64$, $p=.53$.

Test-Takers' Anxiety Levels Between the Modes

To examine the difference of the test-takers' anxiety and comfort levels between the two different

test modes, the survey data were analyzed using paired sample t -test. To do the analysis, recall the survey questions:

1. Nervousness before the test
2. Nervousness after the test
3. Comfort with the interviewer
4. Comfort with the testing environment
5. Comfort with speaking test
6. Comfort with the interviewer's pronunciation

The mean and the standard deviation of test-takers' nervousness indicate little anxiety both pre-interview and post-interview in Table 5. Correlation coefficients were not significant before or after the tests between the modes.

First, the mean difference between pre- and post-interview anxiety on the face-to-face mode did not produce statistical significance: $t(39)=1.29$, $p=.21$. The mean difference between pre- and post-interview anxiety on the videoconferenced mode also did not show significance: $t(39)=-1.57$, $p=.12$.

Second, Table 5 also indicated that the means and standard deviations of pre- and post-interviews are so similar that we expect no significance between the mean differences from the paired t -test. The test-takers' anxiety before the test was significantly different between the modes ($t(39)=2.48$, $p=.02$), but the difference had been removed after the interview ($t(39)=.53$, $p=.60$).

Test-takers' comfort levels with test conditions (survey questions 3, 4, 5, and 6) for each mode

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Table 4. Mean and standard deviation of the two interviews

	Mean	SD
f2f	3.26	.70
On	3.21	.66
Overall	3.23	.62

*f2f = the face-to-face interview: on = the online videoconferenced interview:
overall = overall average scores

Table 5. Test-takers' nervousness before/after the test

		Mean	SD	Correlation Coefficient (p)	Mean Difference	Paired t -test (p)
Before Test	f2f1	3.45	1.60	.29 (.07)	.70	2.48 (.02)
	on1	2.75	1.37			
After Test	f2f2	3.15	1.37	.14 (.39)	.15	.53 (.60)
	on2	3.00	1.34			

* In this table, higher scores indicate higher anxiety.

f2f1 = the face-to-face, pre-interview: f2f2 = the face-to-face, post-interview:

on1 = the online videoconferenced, pre-interview: on2 = the online videoconferenced, post-interview

is presented in Table 6. Correlation coefficients were not significant for the survey questions between the modes. The results indicate that the test conditions were rated as highly comfortable. The results of the correlation coefficients for the test conditions (3. the interviewer, 4. testing environment, 5. Speaking test, and 6. Interviewer's pronunciation) were not significantly correlated between the modes. The results required further investigation with paired sample t -test between the modes.

As shown in Table 6, the test-takers' comfort levels were significantly different between interviewers ($t(39)=2.66, p=.01$). They were less comfortable with the interviewers in the face-to-face interviews than with those in the online interviews. However, the other test conditions such as testing environment, speaking test, and interviewer's pronunciation did not differ significantly between the modes.

Relationship Between the Test-Takers' Anxiety Levels and Performance

To investigate the relationship between test-takers' anxiety levels and their performance, correlation coefficients were analyzed. There is a significant moderate high, positive correlation between scores on face-to-face and online videoconferenced interviews (f2f_overall – On_overall, $r=.67, p=.00$). If test takers scored high on the face-to-face test, he/she tended to also score high on the videoconferenced test. Additionally, there were significant relationships between some, though not all, of the anxiety and comfort measures and interview performance.

Both pre and post face-to-face interviews had significant, moderately high, negative correlations with the test-takers' performance for the pre-interview ($r= -.50, p=.00$) and for the post-interview ($r=-.44, p=.01$). The results indicate that

Table 6. Test-takers' comfort levels with test conditions

	Mean	SD	Correlation Coefficient, (<i>p</i>)	Mean Difference	Paired <i>t</i> -test (<i>p</i>)
f2f3 = #3 on the face-to-face interview	5.55	.90	-.20 (.22)	.70	2.66 (.01)
On3 = #3 on the online videoconferenced interview	4.85	1.23			
f2f4 = #4 on the face-to-face interview	5.20	.91	.11 (.52)	.38	1.67 (.10)
On4 = #4 on the online videoconferenced interview	4.83	1.17			
f2f5 = #5 on the face-to-face interview	4.23	.99	-.02 (.91)	.38	1.47 (.15)
On5 = #5 on the online videoconferenced interview	3.90	1.26			
f2f6 = #6 on the face-to-face interview	5.30	.97	-.17 (.29)	.43	1.65 (.12)
On6 = #6 on the online videoconferenced interview	4.88	1.16			

the higher the test-takers' anxiety levels, the lower scores they received. However, the test-takers' performance on the videoconferenced interview and their pre- and post-interview anxiety levels were not significantly correlated with each other: for the pre-online videoconferenced interview ($r=-.25, p=.11$) and for the post-online videoconferenced interview ($r=-.31, p=.06$).

The relationship between the test takers' anxiety levels and their performance scores were analyzed on each scoring feature. The mean and the standard deviation are reported in Table 7. All of the correlation coefficients of the scoring features between the modes were significant, meaning that those who scored high on a scoring feature in the face-to-face interview tended to score high on the same scoring feature in the online videoconferenced interview. The results of the paired sample *t*-test between the scores between the modes demonstrate that there was no significant mean difference between the two modes according to the scores.

Table 8 shows that there were significant correlations between the scoring features on the face-to-face interviews and pre- and post-test anxiety reported for the face-to-face interviews. The higher the students' anxiety levels pre- and post-interview, the lower they scored on the in-

terview overall and on each scoring feature. However, there was no statistical significance between the scores and the comfort levels with test conditions.

Table 9 indicates that there were significant correlations between all the performances on the videoconferenced interviews and the pre- and post-interview anxiety levels in the face-to-face interviews except for that between the videoconferenced function score and the post face-to-face interview ($r=-.258, p=.108$).

Lastly, most of the correlations between the online videoconferenced performance scoring features and the online anxiety and comfort levels, as measured by the survey administered after the online videoconferenced interview, were not significant. However, the correlation between online videoconferenced coherence score and online videoconferenced post-interview anxiety was significant, but negatively correlated ($r=-.32, p=.043$). The correlation between online interactivity scores and online videoconferenced post-interview anxiety was also significant, but negatively correlated ($r=-.325, p=.04$). Thus, meaning that those with lower anxiety after participating in the online videoconferenced interview tended to score higher in terms of coherence and interactivity.

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Table 7. Analysis results of the test-takers' performance scores by scoring feature

	Mean	SD	Correlation Coefficient (<i>p</i>)	Mean Difference	Paired <i>t</i> -test (<i>p</i>)
f2f_fluency	3.25	.70	.69	.01	.15 (.88)
On_fluency	3.24	.64	(.00)		
f2f_function	3.29	.71	.64 (.00)	.04	.41 (.69)
On_function	3.26	.66			
f2f_accuracy	3.28	.74	.68 (.00)	.06	.71 (.48)
On_accuracy	3.21	.65			
f2f_coherence	3.26	.72	.71 (.00)	.06	.75 (.46)
On_coherence	3.20	.65			
f2f_interactiveness	3.25	.73	.68 (.00)	.00	.00 (1.00)
On_interactiveness	3.25	.65			
f2f_overall	3.26	.70	.67 (.00)	.06	.64 (.53)
On_overall	3.21	.66			

Table 8. Correlations between anxiety and comfort levels and performance by scoring feature on face-to-face interviews

	f2f1	f2f2	f2f3	f2f4	f2f5	f2f6
f2f_fluency	-.509 (**)	-.475 (**)	-.132	-.070	.065	.057
	.001	.002	.418	.666	.691	.728
f2f_function	-.532 (**)	-.456 (**)	-.118	-.054	.046	.083
	.000	.003	.467	.743	.776	.609
f2f_accuracy	-.538 (**)	-.437 (**)	-.185	-.084	.008	-.002
	.000	.005	.253	.606	.961	.991
f2f_coherence	-.526 (**)	-.449 (**)	-.197	-.111	-.023	-.006
	.000	.004	.223	.496	.888	.973
f2f_interactiveness	-.540 (**)	-.472 (**)	-.106	.019	.097	.063
	.000	.002	.514	.907	.550	.698

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

DISCUSSION

The data analyses provided a great deal of insight into the nature of anxiety and oral test performance in both face-to-face and videoconferenced interviews. The results both corresponded to concepts

and findings previously published and ran counter to some of the same. The results are organized and discussed below in relation to the original research questions.

Table 9. Correlations between face-to-face anxiety and comfort levels and performance by scoring feature on online videoconferenced interviews

	f2f1	f2f2	f2f3	f2f4	f2f5	f2f6
On_fluency	-.516(**)	-.335(*)	-.166	.104	-.076	-.077
	.001	.034	.307	.525	.642	.637
On_function	-.503(**)	-.258	-.179	.084	-.102	-.084
	.001	.108	.270	.608	.532	.607
On_accuracy	-.575(**)	-.347(*)	-.182	.110	-.074	-.094
	.000	.028	.260	.497	.652	.564
On_coherence	-.573(**)	-.335(*)	-.137	.157	-.058	-.077
	.000	.034	.400	.333	.724	.636
On_interactive- nesss	-.532(**)	-.347(*)	-.197	.087	-.100	-.143
	.000	.028	.223	.594	.538	.378

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Is There a Relationship Between Interview Mode (Face-to-Face or Online Videoconferenced) and Participants' Anxiety Levels?

One would expect to find slightly higher values for anxiety in this study due to Korean learners' generally higher anxiety scores as found in numerous studies (Schwarzer & Kim, 1984; Sharma & Sud, 1990; Woodrow, 2006). However, participants in this study had generally low anxiety as measured by the immediate (state) anxiety survey. This was unexpected. It is possible that since the participants were primarily English majors that anxiety is not manifest as a state anxiety as measured by the immediate anxiety survey. In other words, they are less sensitive to interactions between trait and state anxiety in this context since they are in regular contact with English speakers in their classrooms and studies.

The difference between pre- and post-interview anxiety was not statistically significant for either mode. In other words, anxiety going into the interview was about the same as anxiety coming out of the interview. This finding is similar to what was found in a study on oral tests by Machida

(Machida, 2001), who used a type of immediate (state) anxiety survey. This consistency can either be a signal that the interviewers failed to make the test-takers comfortable or that the already low levels of anxiety are not impacted by the testing process. As to the first possibility, mode did have a significant effect on test-takers perception of the interviewers. They were more comfortable with the interviewers in the videoconferencing environment than the face-to-face environment. However, since there was no significant difference in pre- and post-interview anxiety for either mode, it does not seem that feeling comforted by the interviewers has an effect on the alleviation of anxiety. As for the second possibility, this is supported by MacIntyre and MacDonald (1998). In a study of public speaking anxiety, they found that when measuring state anxiety before and after performance, both moderate and high anxiety groups experienced significant lowering of anxiety, while a low anxiety group did not. This suggests that there may be some merit to the second possibility.

While not significant, those being interviewed via videoconferencing generally had lower anxiety than those being interviewed face-to-face. How-

ever, test-takers' anxiety was significantly different between the modes, with anxiety before the face-to-face interview being higher than anxiety before the videoconferenced interview. Though not in a testing condition, Xiao (2007) also found that those participating in a videoconferenced learning environment reported feeling less anxious in the online condition than the face-to-face condition. These findings, in conjunction with other studies indicating lower anxiety in other forms of CMC, lend more credence to the assertion that video-mediated communication can elicit lower anxiety in language learners than face-to-face interactions. However, there are other possibilities for this finding as well. It is also possible that since the videoconferenced interviews were held after the face-to-face interviews, the participants had become accustomed to the test environment. This familiarity could have resulted in them reporting less anxiety simply because it was a second administration.

Is There a Relationship between Anxiety and Performance?

The results showed that there was no significant difference in participants' performance between the modes, neither overall nor across the scoring features (fluency, functional competence, accuracy, coherence, and interactiveness). Whether participants were interviewed face-to-face or using videoconferencing, they performed about the same. This was expected given that the general consensus in the field is that media itself does not matter (Clark, 1983, 1994). What was of more interest was the possibility that anxiety could influence performance differently in the two modes of interview.

While the expectation was that mode itself would not influence performance, we did assume that anxiety would have an influence on performance. This seems to be true for face-to-face interviews but not necessarily for videoconferenced interviews. Pre- and post-interview anxiety

for face-to-face interviews negatively correlated with test-takers' performance. This was true for overall performance as well as across all the scoring features. What this means is that those who had higher pre- and post-interview anxiety for the face-to-face interview had lower performance scores on both the face-to-face interview and the videoconferenced interview. However, there was no significant relationship between pre- and post-interview anxiety on the videoconferenced interview and performance on either the face-to-face or the videoconferenced interviews. Again, we could refer to the rationale used to explain the fact that face-to-face anxiety was higher than videoconferenced anxiety; videoconferenced interviews are less anxiety provoking or the participants grew accustomed to the test environment after the first test. This explains the lower anxiety levels for the videoconferenced interviews, but it does not explain why even though there is lower anxiety there is not an increase in performance. One would expect there to be increased performance on the videoconferenced interview.

Lastly, there was a significant, negative correlation between the videoconferenced interview coherence score and videoconferenced post-interview anxiety score. This may seem to be a minor finding, but it is of real interest. Coherence relies on quick processing, organizing and presenting ideas, but anxiety can make it difficult to process and formulate responses (Tobias, 1985). Additionally, anxiety can inhibit intake, processing, and output of information (Bailey, et al., 2000), which can account for participants difficulty in formulating organized responses to interview questions.

Limitations

There are limitations in this study that warrant further research and cautious interpretation of the findings. The first of these is sample size. There were Korean 40 test-takers (one Chinese, but fluent Korean speaker) participated in the interviews. All the results of the test and statistical analyses

were cautiously generalized to the population. However, in a convenience sample such as this, it is difficult to generalize past the immediate context. In addition, most of the previous research has been done in western cultures, not in Korean culture. Hence, it is somewhat difficult to match the similarities between the research findings.

Secondly, the organization of the interviews was potentially problematic, namely the decision to hold face-to-face interviews before the videoconferenced interviews, which would have controlled for test order. Although there were no significant differences between the interviewer and rater effects, we can assume that the logistical considerations may have affected some test-takers' anxiety levels. Therefore, we need to cautiously interpret the research findings.

Implications

There was no significant difference between test scores or overall anxiety on the two modes. Therefore, language testers can feel more secure about taking advantage of videoconferencing technologies for oral assessment. This option will enable testers to benefit from a broader pool of potential interviewers and raters, as well as test-takers. The ability to move oral testing from a shared physical location to a virtual meeting place creates a potential to draw people in from distant locations, both foreign and domestic, and serve those who might otherwise go unserved. Additionally, equivalency between test forms also suggests that testers and test-takers can have a choice of face-to-face or videoconferenced testing based on their preferences and situations.

The findings showed that it is possible that videoconferenced interviews are less anxiety provoking than face-to-face. Test-takers' anxiety levels were higher before the face-to-face interview than before the online interview. This could have been due to a growing familiarity with the testing environment. Therefore, one suggestion is for educators and testers to give test-takers more

exposure to testing conditions before an actual test. That is, if they are provided more frequent practice opportunities, they will control their anxiety levels on the speaking test.

Anxiety may have more impact on certain performance measures as represented by the scoring features in this study, and this should be researched further. As suggested by Tobias (1985), interaction between coherence and anxiety can happen frequently and affect performance. Thus, there is a need to investigate which performance measures are key factors effecting final performance or a hindrance to test-takers achieving full performance.

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KEY TERMS AND DEFINITIONS

Anxiety: a feeling of physical or emotional unease.

Conferencing Technologies: a group of technologies used to facilitate communication from a distance. In particular, the use of synchronous text, audio, and video communication technologies.

Online Test: testing implemented using networked computer technologies.

State Anxiety: a type of anxiety that dependent on interactions with trait anxiety triggers, resulting in a sense of worry or physiological discomfort.

Synchronous Communication: communication in real-time either face-to-face or mediated through synchronous communication technologies.

Trait Anxiety: a type of anxiety that is relatively stable, which situated in a particular context or situation.

Videoconferencing: the use of point-to-point or multipoint audio and video tools to synchronously communicate with others over a network.

Chapter 8

Cognitive Skills through CALL-Enhanced Teacher Training

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ABSTRACT

The efficacy of computer-based activities that can incorporate grammar as well as language acquisition is at the centre of debates in CALL and SLA. The concern for this chapter is the integration of CALL in the language classroom in a blended learning environment that includes the acquisition of grammatical content and its effect on language acquisition at a level where the learners are proficient users and communicators. The courseware under investigation was shown to be an effective learning tool for the metalinguistic curriculum and the acquisition of particular English structures, such as tenses and adverbials, but not for morphology. The results give grounds for the conclusion that, if the courseware invites students to apply cognitive skills (rather than mere drills), there will be an effect on language acquisition through the knowledge of grammar.

INTRODUCTION

The availability of computer-assisted language learning tools which help students to learn the formal aspects of language and which assist them in the acquisition of an associated metalanguage (i.e. linguistic terminology) seems limited at present. The acknowledgement of the need for

such input and training facilitates is growing but availability of appropriate tools is still scarce. This is so despite the obvious strength of computer applications to provide platforms for individualized options which allow students to operate at their own pace with a focus on their particular individual needs. There may be a link from this need for computer applications to the continuing debate on the usefulness and desirability of metalinguistic knowledge (i.e. knowledge about

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language) in language learning. The issue needs to be viewed from two perspectives: 1) the role of explicit knowledge in language-learning performance and competence, and 2) the requirement of metalinguistic knowledge as part of the education of future language teachers. For both of these, the objective is a subsequent enhancement of autonomous learning as well as facilitating the readiness to receive instruction at an academic level.

Depending on the particular language taught, and the proficiency level aimed at, the language teacher-training programs at university level will need some inclusion of the formal aspects of the language in question for the reasons. The role for grammar in language learning in general is debated (see for instances Long, 2007, pp. 139-168), but there is a growing understanding of the need to include grammar instruction in the language learning classroom, “Many teachers and researchers currently regard grammar instruction as ‘consciousness raising’ [...] in the sense that awareness of a particular feature is developed by instruction even if the learners cannot use the feature at once” (Hinkel & Fotos, 2002, p.6). One prominent proponent of the role of grammar is Sharwood Smith who states that awareness of grammar “is a necessary step, many people believe, toward fully mastering any language” (2008, p.179). In teacher education, there is the further concern that language teachers should be equipped with the rudimentaries of a language description inventory and the ability to read and understand pedagogical grammars and expositions on language learning in order to make decisions in the language classroom.

This chapter will describe and discuss a study based on a linguistic and pedagogical tool developed specifically with the aim of giving the users the possibility of working systematically and individually with the subject matter at a level which is appropriate for high-proficiency student teachers at the tertiary level. The study was centred on CALL courseware developed from the belief that metalinguistic knowledge has a place in its

own right as well as being a facilitator in the language learning process for high-proficiency learners. The participants in this study utilised the visual interactive syntax learning (*Visl*) tool to develop and enhance their knowledge of word classes and syntactic structures in English. The *Visl* courseware is available in several languages, and there are applications for a variety of proficiency levels, including elementary school.

BACKGROUND

Several studies in a number of countries have found that language teachers often appear to lack sufficient background knowledge of the metalinguistic syllabus, including the lack of a metalanguage in which to talk about language (see for instance Newman & White, 1999). The same is the case for student teachers in Danish universities. When Danish and other Nordic students enter university, they are already proficient users of English with eight to ten years of English language learning behind them. They are basically treated like native speakers in the expectations they are met with concerning reading and comprehension skills. However, they lack knowledge of some of the formal aspects of the language and the ability to discuss linguistic and conceptual aspects of the language in metalinguistic terms (Borg, 2003; Vinther, 2004). Grammar is an unfamiliar concept to many of them, and the little explicit grammar instruction they did receive in their pre-university education was on a very basic level and functional/pragmatic in nature.

The communicative approach, although originally incorporating grammar, now focuses on the expression of meaning and attitudes minimises linguistic awareness, ignoring the fact that the two are intimately related. Ranta sums up the situation in this way, “In reaction to behaviourism, SLA researchers have emphasized the emergence of grammatical forms in learners’ interlanguage rather [than] the correctness of their production”

(2008, p.213). The study by Williamson and Hardman (1995), is summed up by Borg (2003, p. 97), who concludes that it “reveals significant gaps in student-teachers’ knowledge about grammar, misconceptions about language, and a lack of a metalanguage for analysing language use.”

In consequence, it has been a deliberate choice to make linguistic analysis and language description central parts of the first year curriculum of all English language programs at the University of Southern Denmark. The metalinguistic syllabus has become an integrated element in the core linguistic curriculum, and yet, the time allotted to training language analysis and other formal aspects of the language is not sufficient to meet the needs of all students. This lack must be met by supplementary self-access and self-study options. It was for this purpose that the *Visl* tool was developed to facilitate the students’ learning process while trying to make them feel successful by furthering their sense of control over their own learning (Vinther, 2005).

The discipline in which the *Visl* CALL tool is embedded uses traditional textbooks (Bache et al., 1999; Bache, 2000) combined with training on the tool itself to facilitate cognitive skill development through a combination of procedural and declarative knowledge. This goal is reflected not only in the syllabus but also in exam requirements. There are two underlying premises for this. Firstly, that the university study of any language at an advanced academic level should be based on and include the study of linguistics at a theoretical level to make students able to reflect on their own language use and that of others. Secondly, that metalinguistic knowledge enhances and facilitates general L2 proficiency (Ellis, 2004), enabling students to make better progress in their cognitive development by furthering the ability to work autonomously with new material.

THE THEORETICAL FRAMEWORK OF CALL AND SLA

The various SLA considerations of the need for metalinguistic and linguistic knowledge, along with those of consciousness raising, noticing, and focussed attention, draw on many sources ranging from psychology to classroom research. In parallel, CALL draws on SLA in its research network of paradigms. Chapelle (1997) has called for an integration of CALL and SLA as the way to provide theoretical underpinnings for CALL activities. Chapelle finds that: “What is needed then is a perspective on CALL which provides appropriate empirical research methods for investigating the critical questions about how CALL can be used to improve instructed SLA” (1997:21). In other words, research and theories about instructed SLA should also be in the forefront of CALL. Towell (1999) in his assessment of submissions to the CILT Research Forum pointed out that most of the submissions to the Forum were not research in accordance with the traditional research definitions, but perhaps more directed at development than research. Towell’s evaluation points to a state of affairs which still needs addressing in CALL.

Chapelle’s and Towell’s assessments need to be viewed in the light of the issues of CALL effectiveness which has been and continues to be a preoccupation in the field. When new and untried methods are introduced, especially ones that require substantial investment, the case often comes to rest on their efficacy. A detailed investigation of the issue is to be found in Nagata (1996), who compared workbook and computer-assisted language instruction of Japanese particles and sentence construction. She states that “... when it comes to utilizing computers for second language instruction, the question of whether and when computer programmes can be more effective than traditional non-computer instruction is still a basic question to be addressed” (p.55). In her introduction, Nagata notes that many studies from the mid-sixties to the mid-eighties showed

no or little difference in efficacy, and she refers to Kleinmann's (1987) comment that the programmes investigated seemed to be electronic textbooks. Later studies, including Nagata's own, point to the importance of feedback in content and timing. If the programme is able to provide immediate and relevant feedback, computer-assisted instruction seems to achieve better results than non-computer assisted instruction.

The paradigm shifted in the 1990s from research-based studies, like Nagata's 1996 study mentioned above, to learner-centred approaches. It was no longer a question of choosing between computer instruction and traditional instruction. Rather, it became a matter of how best to apply the computer, often with the underlying premise that the computer was a given, among other things because it enhanced learner autonomy, which was and is a goal that serves as a benchmark in pedagogical discussions. Chapelle has addressed the issue at some length (2003), and it is her experience that "The results of research comparing "the computer" to "the classroom" are not conducive to developing principles of language learning and teaching" (p.76), a view which is supported by Garrett (1998), although the latter concedes: "This is of course not to say that efficacy studies are not possible or valid or worthwhile, when they are appropriately constrained" (Garrett, 1998, p.8).

In language learning, be it computer based or otherwise, there is a growing understanding that the communicative approach cannot stand alone and must incorporate both grammar and declarative knowledge. Interaction is indispensable in language learning, but proficiency at an academic level requires some attention to form (Doughty & Williams, 1998; Robinson, 2001; Hinkel & Fotos, 2002; Borg & Burns, 2008). This is especially true for would-be language teachers.

Ellis (2005, p.143) emphasises that, despite disagreements on learning processes, there is a general agreement on the existence of two different types of knowledge (i.e. implicit knowledge and explicit knowledge). Unfortunately, there is

no universal agreement concerning the definitions of implicit and explicit learning and knowledge (Cleeremans & Dienes, 2008). The disagreement about the two constructs as well as their relationship and role in second language acquisition is reflected in the different theories of SLA and the interface positions discussed below. The common distinction is that explicit linguistic knowledge, often used interchangeably with metalinguistic knowledge, is knowledge about the language, and implicit knowledge is knowledge of the language.

In short, whereas implicit knowledge is available for automatic use, explicit knowledge typically involves controlled processes, although, [...], in the opinion of some (e.g., DeKeyser, 2003), it may be possible to proceduralize explicit knowledge to the point that it cannot be easily distinguished from implicit knowledge (Ellis, 2004, p.231).

Metalinguistic knowledge can be said to have two constituent parts, the knowledge of grammatical rules of the language and the metalanguage in which to explain, describe, and discuss linguistic phenomena. This metalanguage can be a general description related to the learners' general language awareness and the ability to self-correct, or it can be a so-called "technical" language comprising linguistic terms and concepts (Sharwood Smith, 2008; White & Ranta, 2002).

The largest (n=509) investigation of the role of metalinguistic knowledge was carried out by Alderson, Clapham and Steel (1997), comprising students at five British universities. Their study had metalanguage as well as linguistic concepts as a substantial element in their definition and testing of metalinguistic knowledge. Their metalinguistic assessment test included identification of parts of speech and linguistic concepts such as subject, predicate, direct object, and indirect object. The study included students of English, French and Linguistics, and the testing was carried out three times over a time span of eight years from 1986 to 1994. The rationale behind the study and the

argumentation for the importance of metalanguage is that “university methods of teaching foreign languages [...] are still based on the assumption that students have a knowledge about language” (p.94). Alderson et al. found no convincing evidence for a correlation between metalanguage and language proficiency in their tests, but did find a moderate correlation between the MLAT (Modern Language Aptitude Test) test results (words in sentences section) and language proficiency (p.116). The students in Alderson et al.’s study reported that they frequently experienced a need for metalinguistic knowledge but also that the terminology and labels used by teachers were inadequately explained (p.109). Alderson et al. comment that perhaps teacher expectation was that the students knew the labels and concepts in question. This conclusion is in accordance with later studies which have reached similar conclusions on the minimal level of metalinguistic knowledge held by language student and even language teachers (Borg, 1999).

The roles of metalanguage and grammatical labels have been investigated by Borg (1999) in order to throw light on teaching practices and teacher cognition to better understand the role of metalinguistic terminology in L2 instruction. The study concludes that more research is necessary since the study was limited to four teachers and the activities focused on forms in grammar lessons. However, the main conclusion is that the application of metalanguage is very individualised and builds on subjective experiences and interaction in the classroom (p.118). Færch (1985) is an eloquent proponent of the use of grammatical vocabulary as he finds it to be “an important heuristic tool” (p.190) for discovery of structures and problem-solving in language learning. Berry (2005) took the same view and emphasised how metalanguage and linguistic awareness are related.

Sharwood Smith (1981), and Sharwood Smith and Rutherford (1985) saw consciousness-raising as “a facilitator for the acquisition of linguistic competence” (1985, p.281); that is, some attention

to form could influence competence. Sharwood Smith (2004) has outlined the relation between metalinguistic knowledge and performance as one between universal grammar and a metagrammar. He sees these two as separate but related and states that both need to work together in the production of L2. “For a metagrammar to operate and indeed for the rawest, simplest kind of metalinguistic awareness (without any knowledge of formal grammar) there still needs to be a link up of sorts with the core language system” (p.270). In his discussion, he further states that, though the two types may be separate, they are linked by a system of interfaces (p.275). Sharwood Smith disagrees with Krashen’s view that explicit knowledge is of no use in fluent performance in that, according to the theoretical framework of Sharwood Smith and Truscott’s theory, he says, “metalinguistic knowledge is as open to automatization as any other domain of knowledge so it therefore makes sense to talk of metalinguistic or metagrammatical fluency” (Sharwood Smith, 2004, p.276). Bialystok’s 1978 model of second language acquisition incorporated the same principle. Thus, Sharwood Smith (2008) concludes, adults will have two sources available for L2 processing and fluency. The conclusion is supported by Bastrukmen et al., who agree that metalinguistic knowledge, including metalanguage, plays an important role in the noticing of structures and thus constitutes an important stage in development of the cognitive skills of the individual student.

The relationship between focus-on-form instruction and the role of metalanguage is the object under investigation by Basturkmen, Loewen, and Ellis (2002). Where Borg focussed on the teachers, Basturkmen et al. included the students’ uptake relative to the use of metalanguage in two different pedagogical situations. The study was based on recordings of communicative lessons, and the focus-on-form episodes (FFE) were analysed for learner uptake in pre-emptive and reactive teacher-initiated and student-initiated events. The study found no significant relationship between

metalinguage and uptake when the situation was reactive or teacher-initiated, but, interestingly, there was a correlation between metalinguage and student-initiated events (p.9). Basturkmen et al. (2002) conclude that “metalinguage appears to be an important means through which students can initiate discourse about language forms in the classroom” (p.10). They propose that “the more explicitly a linguistic item is addressed, the more likely students are to notice and incorporate it in their production” (Basturkmen et al., 2002, p.11). They concede that very little research has been done so far in the role for metalinguage in classroom discourse and recommend that further research should be done about the influence of metalinguage in different language learning contexts. The results of Basturkmen et al. are important as they demonstrate the importance of metalinguage in communicative classroom situations and the subsequent uptake of grammatical items.

The importance of noticing language features is inherent in theories pertaining to the role of awareness in language learning and has been so since Schmidt (1990) established noticing as a precondition for learning. Noticing may lead to awareness, which in turn makes it possible to pay attention to items in the input. In their study of learners of Italian, Gass, Svetics, and Lemelin (2003) operated with two conditions, namely focused attention and non-focused attention, and three linguistic areas: syntax, morphosyntax and lexicon. Their hypothesis was that students in the focused attention group would outperform students in the non-focused attention group on lexicon but not on syntax. The reason for assuming that attention would have the greatest effect on lexicon was that “attention is a limited-capacity processing system and that because one can only attend to a limited amount of material at a time, those learning a language will pay more attention to some aspects than to others” (p.107). Lexical items are easy to isolate and thus easy to focus attention on. Syntax, it was presumed, would be

more abstract and complex and, therefore, not an obvious focus of attention. These assumptions led to the belief that the effect of attention on proficiency would be greatest for lexicon and least for syntax (p.109). That hypothesis could not be confirmed, and the results demonstrated that the greatest impact of focused attention was registered on syntax items. The conclusion was that attention results in learning, partly for lexicon, but especially for syntax and morphosyntax. In the non-focused condition, there was some effect on learning in lexicon but little in syntax and morphosyntax.

The research by Gass et al. also looked at the impact on proficiency, and it showed that the focused attention condition had the greatest effect on proficiency in all three structures for first-year students. For third-year learners there were no significant effects, but the effect measured was greatest on syntax and close to a significant level. The non-focused attention condition showed no effect from pre-test to post-test, except for first-year learners on lexicon. Gass et al. conclude that “focused attention is better utilized in more complex areas” (p.527). Since syntax and morphosyntax are such complex structures, it may be necessary to direct the attention of learners to these structures. The findings of the Gass et al. study (2003) study accord with Hulstijn and de Graaf (1994), who indicated that for learning complex structures, “internal devices” are not enough. Both studies indicate that complex structures such as syntax need particular attention along with lexicon and perhaps even morphosyntax. Gass et al. suggest that syntax learning may be a different process from that of lexicon learning and perhaps even from morphosyntax. One hypothesis is that for lexicon the internal mechanisms are sufficient for the learning to proceed, whereas for syntax and morphosyntax focused attention through explicit grammar instruction may be necessary. The suggestion is that an introspective type of follow-up study could reveal some of the hypothesized differences in the cognitive processes.

Schultze (1999) focused on feedback in his research of the *Textana* grammar checker that provided feedback on morpho-syntactic errors rather than on style, which is typically what the commercial grammar checkers do, “they notify the text producer of the over-use of passive constructions, point out sentences which are either too complex or too long” (p.121). Schultze outlines four types or levels of feedback incorporated in *Textana*: 1. error warning, when a possible error has been detected; 2. highlighting the part of the sentence which contains the error; 3. providing a general explanation of a rule; 4. including specific explanations of errors. A final level, correction, could be a potential addition. Schultze argues that this type of grammar checker would provide useful feedback at the production level for language learners and that it would be in accordance with the communicative approach of focusing on form in context rather than focusing on forms in rule isolation (p.123; see also Doughty and Williams, 1998).

The grammar checker *Grammatik V* was investigated in a study by Wei and Davies (1996) and the results presented at the EUROCALL 96 conference in Hungary. Original texts produced by learners of English as a second language were subjected to processing by the grammar checker which could react to three categories of errors: mechanics (e.g. spelling), grammar (word classes and S-P agreement), and style (according to a chosen formula, [e.g. business letter]). According to Wei and Davies, *Grammatik V* was not particularly effective in detecting parts of speech:

...the programme would fail to identify subject and verb not immediately adjacent to each other but with modifiers in between; and it would sometimes fail to identify parts of speech (i.e. perceiving nouns, adjectives or adverbs as verbs, or vice versa). This may have been caused by the limitation of the programme’s parsing ability; nevertheless, some of the commonly used sentence structures

and collocations were neither recognised nor accepted (p.5 of document retrieved 2001).

These program glitches emphasise the need for users to have a level of attainment which allows them to make discriminating judgements of the responses given by the computer programme. Hence a tool like *Grammatik V* might be an interesting and valuable instrument for very advanced learners but quite unsuitable for learners whose interlanguage is less sophisticated.

A study by Heift (2004) continues in this vein. It was based on the *E-Tutor* and comprised 177 students of German at three Canadian universities at the level of beginners, advanced beginners, and intermediates. The effect of feedback on uptake was measured for three conditions: metalinguistic, metalinguistic + highlighting, and repetition + highlighting. The results showed the best effect for metalinguistic + highlighting. The students in the metalinguistic group had their errors identified with an exact description of the nature of the error, for example the use of a wrong tense, and with an indication of which tense the learner needed to use instead. The exact correct answer was not provided, but links were provided to inflectional tables, dictionaries and tailor-made help, and the student had to self-correct the error. The metalinguistic + highlighting group received the same feedback and had the same options but with the added feature that errors were highlighted. The repetition + highlighting group received no detailed feedback but only an indication that the error was in grammar or lexicon. If an error was made the student’s input would be repeated and the error highlighted. The results reported by Heift add to the growing understanding that noticing, attention, and metalinguistic input are facilitating factors in language learning and the development of cognitive skills, and that CALL applications can be valid tools in the classroom.

Apart from the *Visl* tool, there seems to be few other CALL tools that focus on the pedagogical application of syntax learning. One such tool,

however, has been developed by Kempen and associates (Kempen 1999) at Leiden University. The program is comparable to *Visl* and helps students determine correct word order and give interactive and corrective feedback. The system also features an interface for children with a ghost family called *Spookjes* who illustrate dependency structures and the syntactical hierarchy and are designed to be fun to work with. The lexical frames on which the system is founded enables the formation of families which are visualised as ghost father, ghost mother, and ghost children (for illustrations see Kempen, 1999, pp.232-233). One feature of the system is that the representations of sentences can work with, as well as without, linguistic terminology which increases its potential applicability to several levels of proficiency. Kempen and Harbusch have continued their ground-breaking research in intelligent CALL (Harbusch and Kempen, 2010) towards an application based on sentence generation in aid of learner uptake of Dutch syntax, and thus in parallel to the aim of the *Visl* tool.

Chapelle and Heift (2009) have investigated the role of individual learner differences in CALL with particular emphasis on the field-independence/field-dependence (FID) dichotomy involving 50 learners of German as a foreign language at Simon Fraser University in Canada. The field-independent type of student is one who is analytic and focused on detail. A field dependent student is one who has a more holistic learning style and is less focussed on detail and rules, “in the context of L2 learning field independence may be related to better success with detecting patterns in the L2 input, dealing with grammatical rules [...], whereas field dependence may facilitate learning holistically from input memorization “ (Ortega, 2009, p.206). The subjects worked with *E-Tutor*, which comprises grammar learning aids and a dictionary. This was the programme that Heift used for her 2004 study of different metalinguistic learning conditions as mentioned above. The result of the Chapelle and Heift study was that field-independent students did not take advantage

of the grammar aids to the same extent as the field-dependent learners. The participants were not tested for learning outcomes as the purpose of the study was to investigate whether different learner types take advantage of the design features to the same degree. The study is relevant for the CALL field in that it raises questions about the perspectives of design features in relation to individual differences and preferences, demonstrating that features are not always used the way they were envisioned. The personal computer and the host of mobile devices, which are becoming available at an increase pace, are among most individual learning modes, and learners take advantage of features in countless fashions not always foreseeable by designers. By contrast, McBride and Seago (1997) propose that many grammar resources fail to demonstrate their full learning potential because learners cannot utilise all the supportive functions available in the design. They found that the utilisation of the features assume or presuppose a fuller knowledge of basic grammatical concepts and appropriate metalanguage than is actually the case for most students. Also Garrett (1995) in her analysis of the efficacy of intelligent CALL (ICALL) maintains that often learners lack understanding of the grammatical concepts and forms, which means that many CALL applications are not bringing learners forward due to the students’ inability to exploit and benefit from the inherent potential of the courseware. Previous research in SLA and CALL has demonstrated the importance of noticing, attention and awareness. It has become evident that metalinguistic knowledge, including metalanguage, is of importance in fostering awareness and subsequent L2 learning. The studies reported on above have added to the understanding that CALL contains interesting and adaptable possibilities that offer a setting in which these qualities can be supported and enhanced. CALL constitutes a relevant, and continuously developing, alternative for individual and as well as classroom learning. There are grounds for believing that custom made courseware which

incorporates linguistic and metalinguistic features in accordance with SLA theory will prove to be beneficial to a pedagogically and epistemologically viable learning environment. The *Visl* program was initiated on these premises, and it is on this background the present study of the effectiveness of the metalinguistic syllabus feature of *Visl* was initiated.

THE STUDY

The use of CALL applications and methodology in English study programs at Danish universities is in its infancy. Hubbard (2006) found in his interviews on CALL in teacher education that there was a general belief that teachers needed no special training and that anyone interested in CALL would just pick up the necessary skills (p. 33). Furthermore, as expressed by Bick, "...there is still some resistance among both school and university teachers concerning all things technical" (2005, p.53). This resistance is partly due to the university tradition of research-based courses, which for English studies is theoretical rather than applied. The task was therefore to create CALL programs and materials which could be integrated in theory-based courses. These are requirements which primarily call for custom-made courseware. The *Visl* application is one answer to this need, and it was created with a view for students to work under guided supervision in the initial phase. At the next stage, the courseware would enable each student to continue his or her training according to their particular needs in a blended learning environment. The advantage for the students is that the courseware is web-based and available on their home computers.

The Experimental Courseware

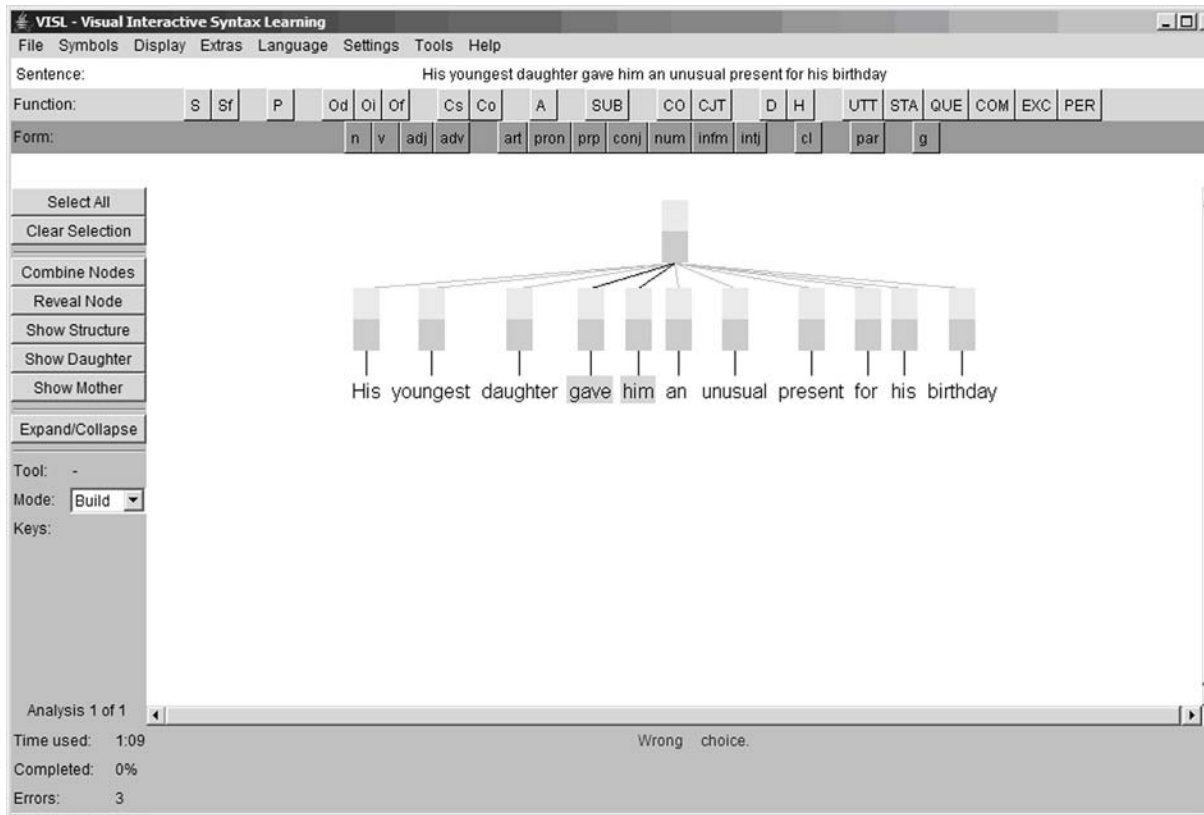
The *Visl* courseware is based on a parser developed in the theoretical framework of Constraint Grammar. This was first developed by Fred Karlsson

(1995), and further developed by Eckhard Bick (2001) in the format on which the present study is based. The *Visl* program offers a variety of features, all of which are focused on syntax learning and on development and learning of metalanguage and linguistic concepts (see <http://beta.visl.sdu.dk>). The various interfaces are very dissimilar, though. Syntactical structure, for instance, can be handled in two different modes: automatic, free text input, parsing, and a pre-analysed set of structures aimed at many different levels of difficulty. In addition, each mode offers a choice of different interfaces, such as tree diagrams, flat structures, and source and vertical structures (illustrated below and in Figures 1 and 2). Table 1 is an example of such a vertical source structure for parsing and tagging the sentence *His youngest daughter gave him an unusual present for his birthday*. The source is given in the tagging of each word along with the relevant grammatical information for the form used in the particular sentence. 'His', we are told, is derived from 'he', and its genitive form is used as a possessive pronoun, third person singular about a male referent ('he', <poss> m,3sg,gen). The relation between the words in the sentence is indicated by sentence function (S=subject, P=predicator, Oi=object indirect, Od=object direct, A=adverbial) and by the dependencies of the words constituting each sentence function (D=dependent, H=head). For the sentence constituents of S, Od, and A it is indicated that the form is complex (g=group), unlike the P, which consists of a single verb, and the Oi, which consists of a pronoun. The verb of the predicator is tagged as being derived from 'give', and the form used (gave) is finite imperfect. The indirect object is tagged as being derived from the personal pronoun 'he', and the used for 'him' is the third person singular accusative form.

The example sentence is also used in the screen shots of the tree-structure applications illustrated by Figure 1 and Figure 2.

In the present study, students worked with the tree-building interactive interface (as illustrated

Figure 1. Interactive tree-building interface. Stage 1.



in Figures 1 and 2), which incorporates a number of input enhancement features. These include a colour bar in green for all the sentence constituent functions (light grey in Figures 1 and 2), and one in blue (dark grey in Figures 1 and 2) for all the possible forms these constituents can assume. These bars are visible at all times and give live information about what they represent when students point at them with the cursor. These information features support enhancement of input and provide feedback on the structural progress of the learner. Some of these supportive features can be seen in Figures 1 and 2.

When the Java Applet opens, the interface looks like Figure 1. Each word in the sentence has a representation in the form of a square 'box', which is divided into two halves; the upper half of the box (light grey in image) is where the learner

enters the sentence function of the constituent/word(s), and the bottom half (dark grey in image) is where the learner enters the form of the word/constituent. The slant grey lines above the 'boxes' indicate that the sentence structure is incomplete. However, the two black slant lines above the predicator 'gave' and the indirect object 'him' indicate that the structure is complete for these two items. In addition to the black lines above the 'boxes', the red colouring of the words beneath the boxes (dark grey in image) will tell the learner that there is nothing further to be done to these two constituent functions; they have reached their end level.

As the learners work to build the structure of the sentence and to label constituents, they receive indirect (implicit) feedback in that the courseware immediately responds to the input by either accepting or rejecting it. The direct help features of

Figure 2. Tree diagram example from the interactive interface. Successfully completed stage.

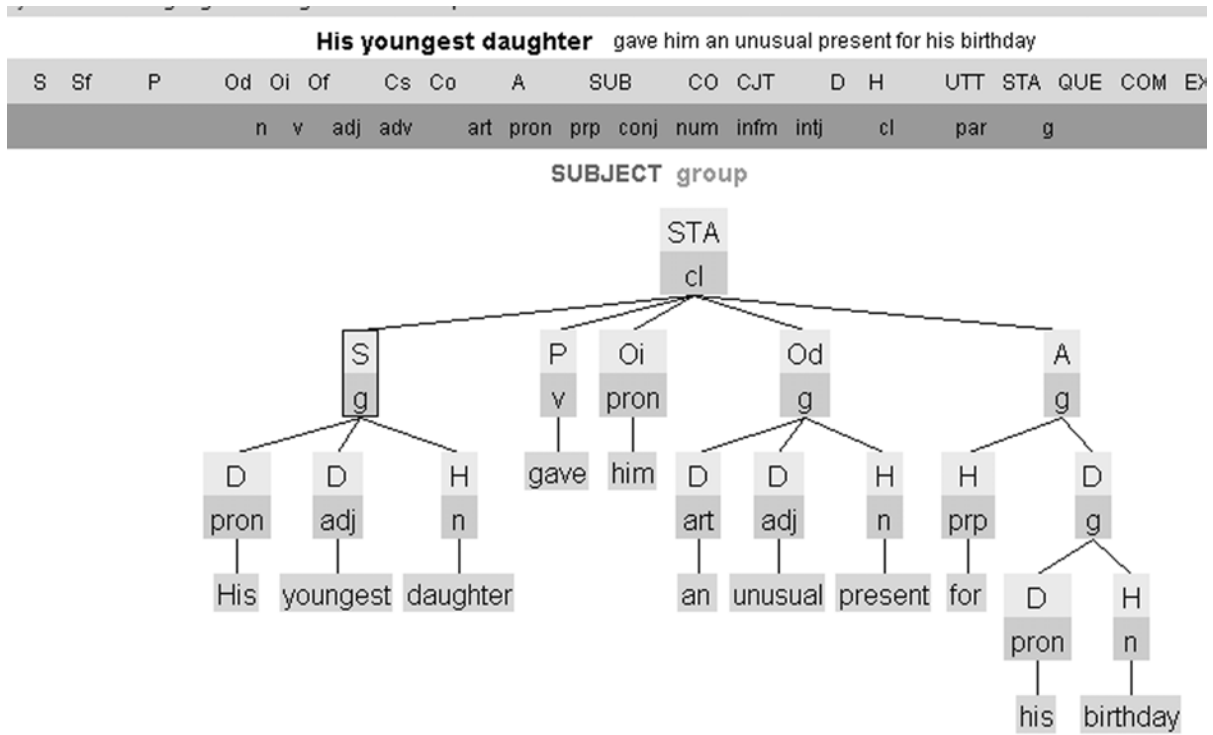


Table 1. Example of a vertical source structure for parsing and tagging

<i>His youngest daughter gave him an unusual present for his birthday.</i>	
STA:cl	
S:g	
=D:pron('he',<pos> m,3sg,gen)	His
=D:adj('young',sup)	youngest
=H:n('daughter',sg,nom)	daughter
P:v('give',fin,impf)	gave
Oi:pron('he',<pers> m,3sg,acc)	him
Od:g	
=D:art('an',<idef>)	an
=D:adj	unusual
=H:n('present',sg,nom)	present
A:g	
=H:prp	for
=D:g	
=D:pron('he',<poss> m,3sg,gen)	his
=H:n('birthday',sg,nom)	birthday

the interface consist of explicit information on the screen when the cursor is moved over the tool bars on top of the screen as described above. There are two help functions: first, it is possible to ask the computer to reveal individual nodes (functions or forms); second, a more comprehensive list of symbols and grammatical explanations is available from the Info pages. The successfully completed analysis of *His youngest daughter gave him an unusual present for his birthday* is illustrated in Figure 2: all slant lines are black (which indicates that the structure is complete), all the words are red (dark grey in image), and all the 'boxes' are labelled with functions of the constituents and their forms. Furthermore, the online site, whose core functions available free of charge, holds translation features, a number of linguistic games, and grammatical quizzes. Most of these are available at varying levels of difficulty, and specially developed applications adapted to pre-university education are now used in Danish elementary and upper secondary schools.

During a ten-week period, the participants in the experiment worked with sentence analysis as a means of enhancing their knowledge of the English syntactical system in the wider framework of acquiring metalinguistic structural knowledge. The *Visl* courseware was designed to make the content of the curriculum more accessible and easier to handle by students presenting multiple repetitions at a slower pace than would be possible in face-to-face lecturing. The possibility of adapting the pace allows the learner time for cognitive activities such as reflection and analysis. The program software was developed by researchers at the University of Southern Denmark as a custom-made interface in support of the syllabus, but is now accessed and used by teachers and students round the world. The site has several thousand hits every day.

The Participants of the Study

The subjects in this study were Danish students of English at an advanced level with an average of eight years of ESL instruction behind them. There were 36 participants in this study, 18 students in each of the two cohorts. Cohort one consisted of students with a speciality in English for academic purposes (EAP), and cohort two participants specialised in English for special purposes (ESP). The EAP group has an interest in linguistics in its own right whereas the ESP group has a more functional interest in the language. The participating students were randomly selected according to their last name from the larger number in their total populations in their respective lines of study. The reason for including both groups was to test if the software would function equally well in both instances. Since the two different groups of students have different focuses and interest, they might also approach *Visl* in different ways. The inclusion of the two groups would ensure that the positive or negative results could not be due to particular interests of the experimental group.

Students in the two groups know how to form questions, conjugate regular verbs and the most common irregular verbs, put nouns into the plural form, place simple adverbs correctly although adverbial phrases remain a problem, and they have a fairly large vocabulary and a good pronunciation. On an interactional and a communicative level, they are well-functioning and competent. Their level of proficiency in English would be equivalent of the Common European Framework level of C1. This level signifies that students:

Can understand with ease virtually everything heard or read. Can summarise information from different spoken and written sources, reconstructing arguments and accounts in a coherent presentation. Can express him/herself spontaneously, very fluently and precisely, differentiating finer shades of meaning even in more complex situations. (Common European Framework,

p.24; http://www.coe.int/t/dg4/linguistic/Source/Framework_EN.pdf)

The communicative and comprehension skills of the participating students are highly developed, but their knowledge *about* English is quite another matter. It is slightly puzzling why this is so since the entrance requirements to the university are based on the upper-secondary school leaving exam. This would include some knowledge of Latin and an additional foreign language besides English. Perhaps one of the answers to this puzzle lies in the findings in Xu and Bull's (2010) discovery that the students in their study had never been asked to face their own insufficient or faulty knowledge. Xu and Bull's interesting CALL experiment with Chinese advanced learners of English involved getting the students to confront their own internal rules with the rules of the target language. It seemed that among the benefits enjoyed by the participants of this study were heightened awareness and metacognitive abilities.

Data Collection

The data were collected on the basis of a ten-week treatment period with one weekly contact hour in the computer-room. The participants worked individually on their own computer in full control of time and pace. As described above, the courseware has inbuilt support and help functions that are always accessible to the users. In addition, the researcher was present in all sessions and available in case students wanted further explanations or if they were in doubt as to how to interpret the courseware support. During the ten-week learning period, the students worked with syntax by analysing English sentences in the tree-building format of the interface (see Figures 1 and 2). The knowledge acquired during the learning period can be seen as a result from the processing of sentences. The sentences were provided by the researcher to ensure that all the desired linguistic structures were included. Each sentence was

written into the courseware by the learners, and they had to apply their metalinguistic knowledge to hypothesis-testing and problem-solving in the parsing process.

The results were measured in a pre-test/post-test design measured in two ways. One set of test items focused on the explicit metalinguistic knowledge. The test items measuring explicit knowledge consisted of items that asked participants to identify or classify instances of word classes (e.g. in some items students were asked to underline all nouns, verbs etc in a given text; other items were multiple choice items where they had to choose the word class of listed words). The test items for sentence constituents contained a sentence or short text, and test takers were asked to underline the particular constituent, or the item listed two sentences and asked which one containing the particular constituent). The set of test items measuring implicit procedural knowledge followed the conventional method of grammaticality judgements (Ellis, 1999) and consisted of items for which the students would draw on their intuitive response.

The items measuring implicit knowledge were included due to the interest in investigating a potential link between implicit and explicit metalinguistic knowledge as outlined in the review of previous SLA and CALL studies. The main object of the *Visl* study was to measure the learning outcome with regard to explicit metalinguistic knowledge. This is what *Visl* was designed for, and the primary incentive was to measure this effect. The expectation was that since the courseware and the instruction was focused on explicit knowledge, there would be little effect on implicit knowledge. The literature of previous research has shown a link between explicit and implicit knowledge, but these studies were not so narrow in scope as *Visl*, with its focus on sentence analysis, terminology, and what White and Ranta (2002) and Sharwood Smith (2008) call "technical" language. Since the *Visl* features were designed to focus the attention of learners and enhance their awareness of linguistic

Table 2. Explicit knowledge. Overall pre-, post-, gain levels. Point scores (max 16) and percentage points.

Cohort 1 (n=18)				
Treatment	mean	sd	mean%	sd
PRE	6.68	2.62	41.70	16.3
POST	11.30	2.16	70.60	13.5
GAIN	4.62	1.95	28.90	12.2
Cohort 2 (n=18)				
Treatment	mean	sd	mean%	sd
PRE	5.47	2.92	34.20	18.3
POST	11.70	2.02	73.20	12.6
GAIN	6.24	2.39	39.00	14.9

as well as metalinguistic features, the potential for formation of implicit knowledge was inherent, but the effect, if any, would be more precarious and indirect. Indeed, the results of the two sets of test item would put the success rates achieved in explicit knowledge into perspective.

RESULTS

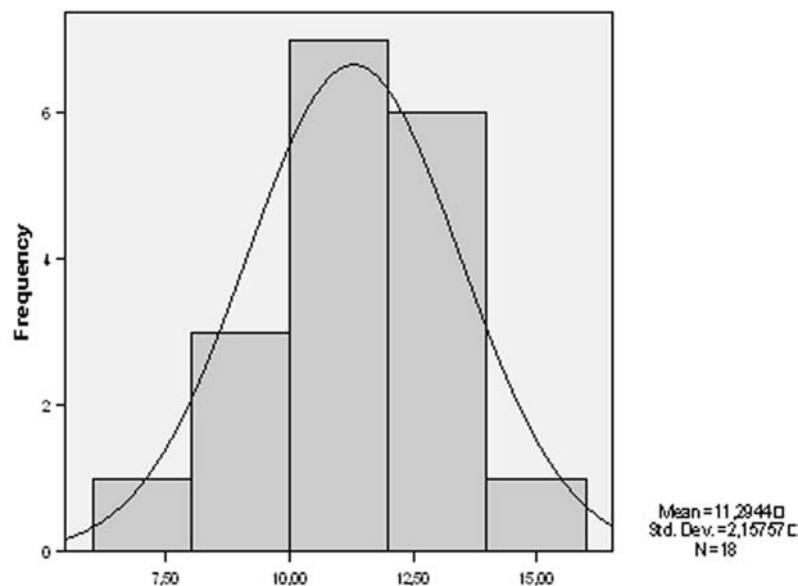
The Overall Level of Metalinguistic Abilities

The level of overall prior knowledge of metalinguistic abilities was measured in the results of the pre-test (Table 2), which the participants in the study undertook at the beginning of the experiment. The results of the corresponding post-test (Table 2) were mapped as a measure of the level of knowledge after the experiment. The difference between pre-test results and post-test results was taken as measure of the effect of the treatment.

The pre-test level of Cohort 1 was higher and the standard deviation (SD) was lower than that of Cohort 2, which should indicate that the level of explicit knowledge in Cohort 1 was higher than was the case for Cohort 2 (Table 2). The lower standard deviation is an indication that Cohort 1 was a more homogenous group than Cohort 2. The post-test results, however, reversed the pic-

ture. Cohort 2 reached a higher mean level than Cohort 1, despite the fact that the initial level was lower. The difference in gain between pre- and post-tests was 28.90% for Cohort 1 and 39% for Cohort 2 (See Table 2). There is no ready explanation for this, but the histograms in Figures 3 and Figure 4, which have an incorporated indication of the normal distribution (the curve), show that in the post level Cohort 2 deviates from the normal distribution by having an over-representation of observations at a level lower than the normal distribution would predict. The histogram in Figure 4 visualises the fact there are no observations just below the middle, which indicates that for Cohort 2 the treatment has succeeded in lifting the bottom level better than for Cohort 1. Furthermore, there are also more observations than expected at the upper-middle level. The end result is that Cohort 2 achieves a mean result slightly higher than Cohort 1, while the observations for Cohort 1 appear to be concentrated round the middle spectrum. Generally speaking, it means that the participants in Cohort 1 become almost equally good with achievements at the medium level. For Cohort 2 participants, it means that the treatment has divided them into high-achievers and low-achievers with few achieving at the medium level. However, the two Cohorts have almost the same average post results (Table 2). Cohort 1 students were linguistically focussed

Figure 3. Cohort 1. Post (explicit) observations



EAP students, but the achievements of the functionally focussed ESP group in Cohort 2 reached the same level of success despite their lower prior knowledge. An interpretation of this could be that from an overall perspective, the *Visl* courseware is good for all types of learners as far as the acquisition of explicit knowledge is concerned (Figure 3 and Figure 4). The knowledge of particular subcategories are measured in detail by the discrete items and listed in Tables 3 and 4.

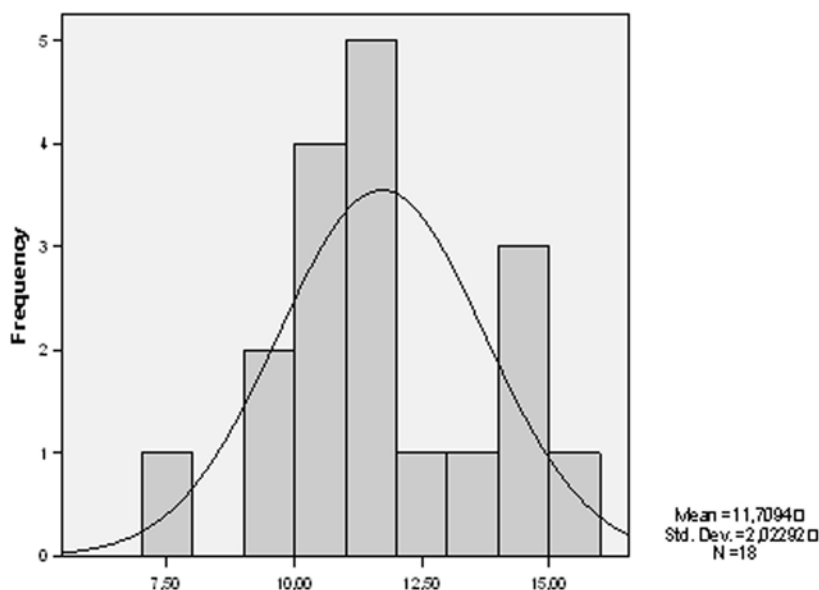
The evaluation of the various group results builds on the acceptance of the hypothesis of equal variances (i.e. a normal distribution of the observations). Normality was tested in a Kolmogorov-Smirnov test, and the z-values were 0.446 for the Cohort 1 post-test distributions of explicit knowledge observations, and 0.540 for the overall results of the explicit knowledge distribution of observations in the Cohort 2 group. These results indicate that the observations are normally distributed, meaning that the measured result differences of the experimental groups can be tested using parametric methods, and that comparison can be made

on a valid basis. The pre-post difference for the two cohorts was tested by paired t-tests. The difference between Cohort 1 pre-test results and post-test results was tested by paired t-test ($df=17$, $p=1.46E-08$ (two-tailed; Pearson correlation 0.68) underlining the significance of the gains. For Cohort 2, the paired t-test for the difference between pre-test results and post-test results ($df=17$, $p=3.13E-09$ (two-tailed; Pearson correlation 0.58) confirmed the significance of the gains.

Explicit Knowledge of Specific Grammatical Categories

The discrete items measuring explicit knowledge fall into two major grammatical categories comprising the metalinguistic knowledge of parts of speech and syntax. As is evident from Table 2, there are clear and convincing gains in explicit knowledge, but this result can be further qualified by examining the specific grammatical content of the items.

Figure 4. Cohort 2. Post (explicit) observations



The parts of speech items comprised nouns, noun-verb distinction, adjectives, noun-adjective distinction, pronouns, adverbs, prepositions, and conjunctions. The syntax items comprised subjects, subjects of main clause, complements to subject, direct objects (clausal and nominal, respectively), indirect objects, and adverbials. Some items asked the participants to identify the category in a text by underlining; other items listed the words/expressions and asked the participants to give the category in a multiple-choice format. As far as prior knowledge is concerned, knowledge of verbs, nouns, adjective (classify), prepositions, and subjects, can be said to represent a solid base of metalinguistic knowledge in overall terms (see Table 3 and Table 4) as these items have mean pre-test results above 50%. The pre-existing knowledge in the syntactic category was expected to be low. The only syntactic category with a result above chance level is that of subject. This corresponds to the findings of Andrews (1999) who investigated the metalinguistic awareness of Hong Kong teachers of English, who were non-

native speakers of English. These teachers were teachers in secondary schools in Hong Kong, and their level of proficiency was advanced and relatively high, but their knowledge of grammar and grammatical terminology was quite low and not sufficient for explaining simple grammatical rules. As discussed by Borg (2003) citing Bloor's 1986 study, the situation was even worse as students found it difficult to identify fundamental elements of a sentence such as 'subject' and 'object'.

The results of the instruction on the two explicit categories of word classes and syntax, respectively, made it clear that there were substantial gains in both categories. The success rate of the category comprising word classes went up from 44% to 74% (Table 3), and the syntax category went up from 31% to a success rate of 68% (Table 4). All the word class items are above the 50% level in the post-test with the exception of the nominal adjective. Performance on this item has in fact regressed in relation to the pre-test, but only for Cohort 1 (Table 3). The nominal adjective is a category which has fewer distinctive features

Table 3. Word class (explicit). Pre-test, post-test, gain means (%).

Cohort 1 (n=18)						
Treatment	PRE		POST		GAIN	
	mean	sd	mean	sd	mean	sd
verbs	100.00	00.00	88.89	31.43	-11.11	31.43
nouns	78.56	29.34	88.11	14.67	9.56	32.04
adjectives	55.56	36.06	69.81	18.05	25.53	43.26
nominal adj.	16.67	39.27	16.67	37.27	00.00	47.14
adverbs	18.00	44.79	83.33	32.27	55.56	49.69
pronouns	15.00	21.15	62.22	28.00	47.22	34.45
prepositions	77.78	41.57	62.22	28.00	-15.56	41.80
conjunctions	00.00	00.00	42.56	41.32	42.56	41.32
Mean	49.16	14.98	69.08	13.08	19.92	12.40
Cohort 2 (n=18)						
Treatment	PRE		POST		GAIN	
	mean	sd	mean	sd	mean	sd
verbs	77.78	41.57	100.00	00.00	22.22	41.57
nouns	81.17	23.32	84.61	18.95	3.44	24.44
adjectives	80.00	38.22	88.86	20.72	29.81	59.95
nominal adj.	27.78	44.79	27.78	44.79	00.00	33.33
adverbs	22.22	41.57	100.00	00.00	77.78	41.57
pronouns	22.22	41.57	69.44	27.58	47.22	46.16
prepositions	38.89	48.75	94.44	22.91	55.56	49.69
conjunctions	11.11	31.43	70.33	38.22	59.22	37.85
Mean	40.13	18.81	76.25	10.95	36.12	14.56

than nouns or adjectives, which could explain the unstable knowledge of this category. Of the syntax items, the clausal direct object remains a problem (below 50% success) as does the ability to identify adverbials. The clausal object and adverbial categories have in common the fact that they are complex forms, and this makes it difficult to find simple and unitary distinctive features. It should be noted, though, that there is noticeable progress for these items from pre-test to post-test (Table 4). There is substantial and remarkable progress in the knowledge of these two categories even though the level remains below the 50% mark. The performance on the clausal object improves from a mean of 14% to 42% (Table 4). For adverbials

the performance improves from a mean of 4% to 35% (Table 4). It must be concluded that the results warrant the view that the *Visl* tool appears to be equally suited for word-class learning and syntax learning.

The Overall Level of Implicit Knowledge

The measure for the overall level of implicit knowledge contains implicit items in three categories (i.e. syntax, morphology and tense-aspect). The knowledge of these grammatical categories was tested by grammaticality judgement items (for discussions of grammaticality judgements as

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Table 4. Syntax items (explicit). Pre-test, post-test, gain means (%).

Cohort 1 (n=18)						
Treatment	PRE		POST		GAIN	
	mean	sd	mean	sd	mean	sd
S complement	27.78	44.79	88.89	31.43	61.11	59.06
O direct (cl)	16.67	37.27	44.44	49.69	27.78	55.83
O direct (nom)	38.89	48.75	72.22	44.79	33.33	47.14
O indirect	44.44	49.69	83.33	37.27	22.22	59.06
S main clause	33.33	47.14	55.56	49.69	37.11	53.29
Subject	57.39	45.57	94.50	12.30	24.28	44.31
Adverbial	6.72	9.80	31.00	23.92	24.28	25.18
Mean	32.17	14.98	67.13	18.89	34.96	19.92
Cohort 2 (n=18)						
Treatment	PRE		POST		GAIN	
	mean	sd	mean	sd	mean	sd
S complement	16.67	37.27	88.89	31.43	72.22	55.83
O direct (cl)	11.11	31.43	38.89	48.75	27.78	44.79
O direct (nom)	55.56	49.69	55.56	49.69	00.00	74.54
O indirect	44.44	49.69	94.44	22.91	50.00	50.00
S main clause	27.78	44.79	72.22	44.79	44.44	59.84
Subject	42.50	36.58	96.28	15.35	53.78	35.46
Adverbial	1.83	7.56	38.44	18.92	39.61	20.41
Mean	28.56	23.54	69.25	20.13	40.69	24.26

measuring instruments see Ellis, 1991; Alderson et al., 1997). Table 5 demonstrates that the level of pre-test knowledge was much higher in the implicit than the explicit category. The overall level of implicit knowledge in both Cohort 1 and Cohort 2 is above the 50% mark unlike that of the explicit category (see Table 3). A two-tailed t-test was carried out on the pre-test scores of Cohort 1 against Cohort 2 in this aspect. The test revealed no difference between the two cohorts ($t=1.433$; $p=0.16$) which means that the results from the two groups are comparable.

The post-test results show modest improvements (Table 5), but only the Cohort 2 results appear convincing. The percentage figures reveal that the two cohorts have exactly the same post-test success rates, but interestingly, Cohort 2 had

a lower pre-test mean (63.00) and yet succeeded in reaching the same end level (72.80) as that of Cohort 1 (Table 5). A two-tailed paired t-test was carried out to establish whether the difference between pre-test and post-test implicit knowledge levels for each cohort was statistically significant. The t-test revealed that the hypothesis of equal means could be accepted for Cohort 1 results ($t=0.7042$, $df=17$, $p=0.4908$), but not for Cohort 2 results ($t=2.4654$, $df=17$, $p=0.0246$). This implies that the gains of Cohort 2 are statistically significant whereas those of Cohort 1 are not.

Table 5. Implicit knowledge. Overall pre-, post-, gain levels. Point scores (max 9) and percentage points.

Cohort 1 (n=18)				
Treatment	mean	sd	mean%	sd
PRE	6.28	1.07	69.80	11.9
POST	6.56	1.29	72.80	14.4
GAIN	0.28	1.67	3.09	18.6
Cohort 2 (n=18)				
Treatment	mean	sd	mean%	sd
PRE	5.67	1.46	63.00	16.2
POST	6.56	2.01	72.80	22.3
GAIN	0.89	1.53	9.88	17.0

Table 6. Implicit grammatical categories. Pre-, post-, gain-levels(%).

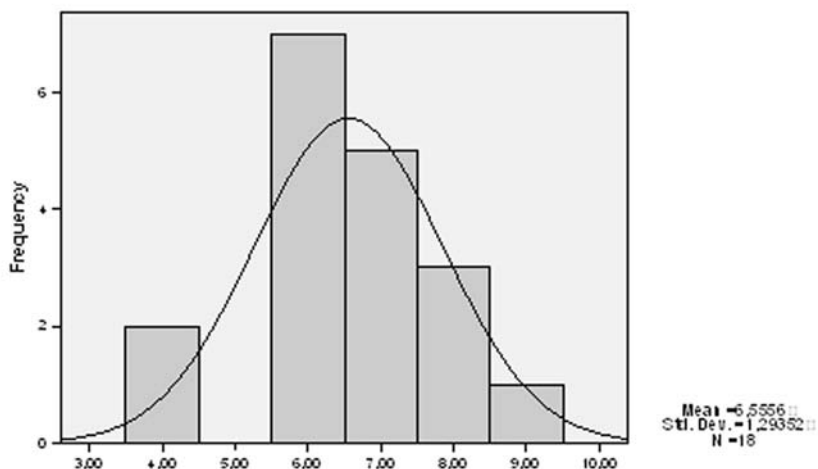
Cohort 1 (n=18)						
Treatment	Syntax		Morphology		Tense-aspect	
	mean	sd	mean	sd	mean	sd
PRE	68.06	20.08	94.44	12.42	36.11	37.60
POST	66.67	18.63	87.04	19.69	63.89	33.46
GAIN	-1.39	28.23	-7.41	20.95	27.78	42.78
Cohort 2 (n=18)						
Treatment	Syntax		Morphology		Tense-aspect	
	mean	sd	mean	sd	mean	sd
PRE	77.78	27.22	83.33	25.46	41.69	35.36
POST	72.22	31.06	83.33	22.91	58.33	35.36
GAIN	-5.56	25.00	00.00	22.22	16.67	38.35

Implicit Knowledge of Specific Grammatical Categories

In the implicit knowledge category, three types of issues were tested for, namely tense/aspect (present perfect against past tense and progressive against simple tenses), morphology (subject-predicator concord and comparison of adjectives), and syntax (position of adverbials and *that*-ellipsis). The items were grammaticality judgement items where the test takers were given sentences containing the various structures and asked to choose the sentence they judged to be grammatical (Table 6).

The initial knowledge of tense-aspect was low in comparison to syntax and morphology and the lowest of the three (Table 6). The tense-aspect pre-test result was only 36.11% for Cohort 1, and the only one under the 50% mark. For Cohort 2 the pre-test level of the tense-aspect items was slightly higher at 41.67%, but still below 50%. The mean post-test result for tense-aspect reached 63.89% for Cohort 1 and 58.33% for Cohort 2 (Table 6), still below the success rates of morphology. The mean gain rates, however, are unequivocally higher for tense-aspect than for morphology and syntax. The tense-aspect level has seen a marked improvement of 27.78 percentage points

Figure 5. Cohort 1. Post (implicit) observations

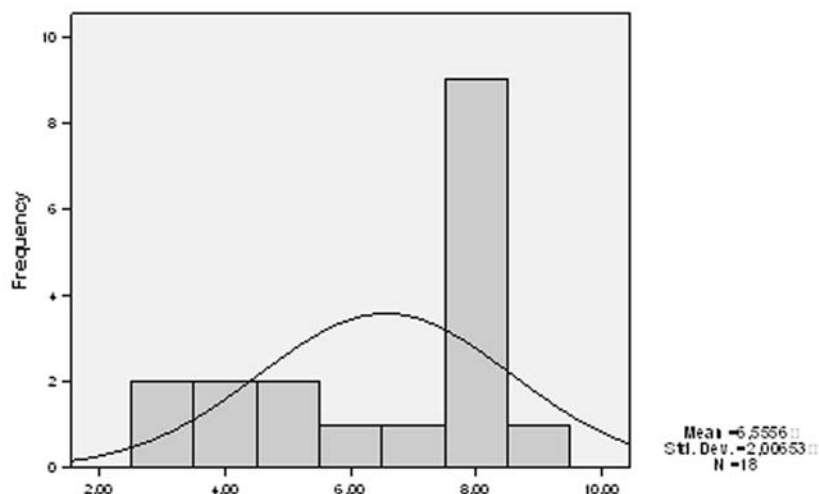


for Cohort 1 and 16.67 percentage points for Cohort 2 (Table 6). These gains become the more noticeable when compared to the categories of syntax and morphology, which have negative or zero gains in both Cohorts (Table 6).

The breakdown for both cohorts of the implicit knowledge category revealed that the initial knowledge of syntax and morphology was high, and, therefore, it was not surprising that the change from pre-test to post-test was modest. As far as morphology is concerned, there was a regression from pre-test to post-test for Cohort 1, albeit of such small dimension that it was probably only coincidence. The important fact is that there was no progression. The morphology mean for Cohort 2 was unchanged from pre-test to post-test. Figure 5 visualises the distribution of observations for Cohort 1 at the post-test. The weight of observations is centred round the middle. The post-test distribution for Cohort 2, which is visualised in Figure 6, shows how a disproportionate number of observations are above the median. There are fewer observations at the middle field, and a few observations outside the normal distribution at the low end of the scale.

The progression in knowledge of adverbials, a subcategory in the overall implicit syntax category (Table 4), showed a mean progression in Cohort 1 of 24.28 percentage points, from 6.72% in the pre-test to 31.00% in the post-test (Table 4), and in Cohort 2 a mean progression of 39.61 percentage points, from 1.83% in the pre-test to 38.44% in the post-test (Table 4). This result is in line with the progress in the explicit knowledge of the word class of adverbs from a mean of 18.00 percentage points in the pre-test to a mean of 83.33 percentage points in the post-test for Cohort 1, and for Cohort 2 a mean progression of 77.78 percentage points from 22.22% in the pre-test to 100% in the post-test (Table 3). The improved knowledge of the word class occurs in parallel with the fact that the sentence constituent of adverbial becomes easier to identify. In the implicit section, there was little progress in the syntax section as a whole. The category contained three types of adverbials: preposition groups, adverb groups, and adverbs. The breakdown of figures revealed that the knowledge of the adverbials consisting of adverbs and adverb groups showed good progress in contrast to the adverbials comprising prepositional groups. The adverbial-

Figure 6. Cohort 2. Post (implicit) observations



als consisting of single adverbs showed a gain of 11.11 percentage points for Cohort 1, up from 33.33.% in the pre-test to 44.44% in the post-test. For Cohort 2, the gain was 27.78 percentage points, up from 33.33 in the pre-test to 61.11 in the post-test. Adverbials consisting of adverb groups progressed for Cohort 1 from 88.88% to 94.44%, a gain of 5.56 percentage points; and for Cohort 2, from 72.22% to 99.44%, a gain of 22.22 percentage points (Table 7). These results suggest that the explicit as well as the implicit knowledge of adverbs/adverb groups and adverbials was affected positively by working with the computer program. The progress in the implicit category (Table 7) appears to be supported by the progress in the explicit knowledge category (Tables 3 and 4).

The explicit knowledge of the word class of adverbs is very high after the learning period and comes to 83.33% for Cohort 1, and 100% for Cohort 2 (Table 3). Thus, it is reasonable to assume that the improved knowledge of the linguistic features of adverbs could make the adverbials function more salient. This assumption is supported by the fact that the adverbials containing

a single adverb and those containing adverb groups consisting of two adverbs show progress, whereas knowledge of adverbials containing preposition groups do not. Learners become able to perceive the features as belonging to the adverb/adverbial category. Similarly, White reported marked improvement in implicit knowledge results from attention to form in her 1991 study of adverb placement. She found that implicit evidence was not sufficient for learning the ungrammaticality of placing an adverbial between verb and object in English. It was necessary to focus attention on these structures through specific classroom teaching. She concludes, that explicit evidence in the classroom is necessary, and that explicit instruction is “effective in helping L2 learners to master the fact that SVAO is ungrammatical in English” (p.158).

The only implicit category to show substantial improvements was that of tense-aspect (Table 6). There is no ready explanation for this grammar category difference in achievement as tense-aspect was not part of the experimental instruction in the treatment period. One explanation that offers itself is that it might be related to developmental

Table 7. Adverbial placement (implicit). Pre-test, post-test, gain means (%)

Cohort 1 (n=18)						
Treatment	A=preposition group		A=adverb group		A=adverb	
	mean	sd	mean	sd	mean	sd
PRE	72.22	44.79	88.88	31.43	33.33	47.14
POST	50.00	50.00	94.44	22.91	44.44	49.69
GAIN	-22.22	71.15	5.56	40.45	11.11	73.70
Cohort 2 (n=18)						
Treatment	A=preposition group		A=adverb group		A=adverb	
	mean	sd	mean	sd	mean	sd
PRE	61.11	48.75	72.22	44.79	33.33	47.14
POST	61.11	48.75	94.44	22.91	61.11	48.75
GAIN	00.00	65.73	22.22	53.29	27.78	55.83

stages in the learners’ interlanguage. Dulay & Burt (1973), Pienemann & Johnston (1987) and Pienemann (1999) have demonstrated that the internal mental system of second language learners (i.e. their interlanguage) develops in certain sequences and that all learners go through the same stages of acquisition. Furthermore, there is a parallel in the findings from Collentine (1997), whose research demonstrated how computer-supported environments can result in bottom-up processing of input even when attending to meaning, and that students do notice and incorporate grammatical structures (the Spanish subjunctive is mentioned as an example) even in situations which ultimately required top-down processing. The perspectives in this line of inquiry deserve further research.

Tense-aspect issues constitute an area where Danish (which was the L1 of the subjects) and English have contrasting applications and expressions, and, understandably, Danish students in line with other Nordic learners of English (Ruin, 1996) find these difficult or problematic. If one explanation is to be offered, it could be that the approach taken with the work on the *Visl* program is focusing attention on one discrete element at a time. One can speculate whether bottom-up processing makes it possible for students to make mental maps combining form and semantic func-

tion in their cognitive processes since they focus on meaning as well as form, word by word. Lieven and Tomasello (2008:180) discuss this, and they give the example of *word+ed*, which the learner may notice is always present when past tense is intended. The noticing of the combination of meaning and grammatical form may result in cognitive processes which support the incidental acquisition of knowledge in addition to what is given conscious attention.

CONCLUSION

The underlying premise of *Visl*, and of the grammar course in which it is embedded, is that the students need to be in possession of metalinguistic abilities in English in order to be future language teachers. *Visl* was designed to enhance the acquisition of explicit metalinguistic knowledge, so it is remarkable that there is an effect on the implicit knowledge of the learners as well as on the explicit metalinguistic knowledge. The results in this study are reassuring and clearly indicate the ability of a CALL application to meet the pedagogical needs of the students as well as institutional demands.

At least two aspects of the learning processes need to be focussed on. First of all, there is the

relationship between explicit and implicit learning and knowledge which is a point of opposing views and theories in SLA; and second, there is the design of the *Visl* courseware itself. The *Visl* application requires the students to be reflective and construct knowledge for themselves through problem-solving. This kind of interactivity facilitates the development of cognitive abilities in contrast to the traditional application where the content is given and used for drill-based activities. The process is captured in this summation by Hulstijn (2002, p.206), "Explicit learning is a conscious, deliberate process of concept formation and concept linking. This may either take place when learners are being taught concepts and rules by an instructor or textbook, or when they operate in a self-initiated searching mode, trying to develop concepts and rules themselves."

The explicit knowledge of word classes appears to be connected to the performance in implicit knowledge of adverbials, especially when these are comprised of single adverbs or adverbs groups with two adverbs. This is unexpected, and may indicate a connection between the implicit and the explicit cognitive processes, or at least that there is a facilitating factor involved. This is stipulated by the proponents of the so-called weak-interface position outlined by Ellis (1993) in contrast to Krashen's non-interface position (1981).

It is evident that the effect of the treatment on the implicit items is different from the effect on the explicit items. The *Visl* tool offers an effective way of acquiring the metalinguistic syllabus and, it appears, competence in particular and limited areas such as tense-aspect and adverbials. Progress in the explicit section was statistically significant, but not in the implicit section as such except for the Cohort 2 results. The relation between gains in the explicit and implicit sections is illustrated by the syntax category, which musters a gain in the explicit category (Table 4) between 34.96 percentage points (Cohort 1) and 40.69 percentage points (Cohort 2), whereas the gain in the implicit syntax category (Table 6) is negative (i.e. regression).

The questions which were the set targets for investigation can be positively answered as far as the efficacy of the *Visl* tool and the instructional content are concerned. The learners do apprehend the metalinguistic knowledge and the related metalanguage. The explicit knowledge acquired through working with *Visl* show good rates of progression (Table 3). The grammatical categories, comprised in the two explicit categories of word classes (Table 3) and syntax (Table 4) show that the effect is greatest for syntax but also word classes have substantial gain results.

Awareness is a critical ingredient in language learning and teaching. The experimental instruction aimed at increasing the students' awareness of the formal aspects of language and at enhancing learners' ability to take advantage of metalinguistic knowledge in their language processing. The results show that there is an influence on the level of knowledge of metalinguistic content and of the connected metalanguage. The question is whether this heightened awareness can transfer into, or facilitate, improvements in language use in parallel to increased implicit knowledge (i.e. language performance). Increases in the meta level increases language performance, as measured by implicit knowledge, only slightly, but it does appear to act as a process initiator with a tenuous link to some aspects of implicit learning, such as for placement of adverbials and tense-aspect (Tables 6 and 7). This conclusion would support the theories developed by Sharwood Smith and Truscott (2005), pointing to the issue of salience as an important factor. The study carried out by Gass et al. (2003) is supported in so far as some aspects of syntax were affected by the treatment in this study. In his review of studies of student teachers, Borg (2003) expressed the view that the lack of a metalinguistic knowledge in would-be language teachers was a matter of concern and that "these findings suggested the need for language teacher preparation programmes to dedicate substantial time to the development of trainees' declarative knowledge about language" (2003, p.98).

The *Visl* courseware applied in this CALL study has proven to be well-suited to the task of facilitating the up-take of a formal grammar syllabus. The features of *Visl* which would be relevant to focus on when considering the positive outcome of the experiment include the enhancing colour scheme, the tree-building structure with the clear depiction of the dependencies of the constituents, and the feedback system. The interface demands students to make conscious and well-considered choices. The immediate feedback reinforces this in that any errors become evident the instant they are made. The students then need to reconsider and construct new answers. The *Visl* courseware is an effective learning tool that can easily be incorporated in the curriculum in an environment of blended learning. This incorporation is probably what is needed at the very advanced levels of language learning at university level. This academic environment has a complex set of requirements, meaning that CALL tools which are too narrowly focused on the language side without incorporating or enabling the linguistic curriculum agenda will be of little use. The future needs of academia will require specialist applications which can be offered to the students as a supplement or self-study possibility.

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KEY TERMS AND DEFINITIONS

Autonomous Learning: The idea of taking responsibility for one's own learning. It can be used to refer to classroom learning as well as distance learning.

Communicative Approach: Instruction is focused on interaction and meaning. Negotiation of meaning is an important stage.

Constraint Grammar: The system of rules developed by Fred Karlsson (1995) used for grammar tagging in the *Visl* parsers.

Explicit Knowledge: Knowledge which is declarative.

Focus on Form: In meaning-centred instruction, formal issues are dealt with in content.

Focus on Forms: Formal aspects of language are instructed as discrete items unrelated to context.

Grammaticality Judgement: The ability to judge whether language expressions are grammatical and correct language use.

Implicitness Knowledge: Knowledge which is procedural and connected to spontaneous language use.

Metalinguistic Knowledge: Knowledge about language consisting of the ability to explain language rules including the terms in which to discuss language.

Metalanguage: General terms of language description and/or technical linguistic terminology.

MLAT: Modern Language Aptitude Test. The test measures phonemic coding ability, grammatical sensitivity, inductive language learning ability, and rote learning ability

Parser: A program which is able to analyse language based on rules (a logarithm).

Chapter 9

Adapting the iPhone for Language Teaching and Learning

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ABSTRACT

This chapter will discuss ways in which the iPhone/iPod Touch can be used for language learning. The built-in functions of the iPhone/iPod Touch, along with the various Web Apps and Apps that can be used to enhance these functions, provide a wide variety of ways in which the iPhone/iPod Touch can be used in language learning. Some of these include built-in recording functions, cameras, handwriting recognition capabilities, as well as a huge array of helpful web-based applications and independent applications. Because this chapter could not possibly cover all the options that are available, it will briefly introduce some of these functions and applications and explore how they can be beneficial to language learners. In addition to this, this paper will ways in which applications useful for language learning or teaching can be searched for via Google Apps or the Apps store itself.

INTRODUCTION

Traditionally, languages have been taught in a face-to-face setting where the instructor introduces grammatical patterns and vocabulary to students who have access to a textbook, workbook, and

lab materials. Things have begun to change as online teaching has become more and more common at the college-level. It is now not uncommon for languages to be taught in either an online or hybrid setting. Even so, beyond the Internet, the tools that are used for language teaching have not progressed too far beyond the additional use of the Internet and computers.

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Adapting the iPhone for Language Teaching and Learning

This paper will look at the use of the iPhone and/or iPod Touch as new tools for language teaching. It will explore some of the various options available and how these options can be used in the classroom (face-to-face, hybrid, or online).

Previous Studies

Much research has been done on the effectiveness of the use of mobile devices for learning. To date, however, most of the focus has been on the use of laptop computers and PDAs with some interest in the use of mobile phones. For some, there is skepticism as to how well mobile phones or similar small devices can be used to improve learning. The focus, here, seems to be on size. Gianna Avellis, Antonio Scaramuzzi, and Anthony Finkelstein (2004) summarize it as follows:

“The small screen size of mobile devices... makes some people question their worth as e-learning delivery tools. Some... critics do point to the restricted input capabilities... of some of these devices, questioning students’ ability to enter large amounts of text into a device to take notes or answer an essay-type question.” (p. 15)

However, many research efforts have pointed to some of the benefits of using such technology. George M. Chinnery (2006) points out that, in using such devices, one needs to have an understanding of how to apply these devices to language learning. He says:

“... technologies, mobile or otherwise, can be instrumental in language instruction. Ultimately, though, they are not in and of themselves instructors; rather, they are instructional tools. And the effective use of any tool in language learning requires the thoughtful application of second language pedagogy.” (p. 9)

Again, Chinnery (2006) points to some of the limitations of using these devices. Specifically, he points to the following:

“Notwithstanding its benefits, MALL [Mobile Assisted Language Learning] also poses related challenges. For instance, inherent in the portability of mobile media are reduced screen sizes, limited audiovisual quality, virtual keyboarding and one-finger data entry, and limited power... Other potential drawbacks include limited non-verbal communications, limited message lengths, a lack of cultural context, and potentially limited social interaction.” (p. 13)

Agnes Kukulska-Hulme (2006) also points out that the use of mobile technologies is still rather new. She summarizes this as follows:

“We are still in the early days of the application of mobile technologies to language learning. Perhaps unsurprisingly, a number of early examples feature rather conventional approaches, reflected in activities that take some advantage of portability but do not yet appear to be exploiting the full range of potential. It seems that there is always a hunger for the comfortably familiar basics: typically, vocabulary and grammar, in the form of structured modules and exercises. Mobile devices are well suited to support these kinds of activity, whose value should not be dismissed, but mobile learning has far more to offer.” (p. 119)

Two devices that are relatively new to the Mobile Assisted Language Learning scene are the iPhone and iPod Touch. This paper will look at some of the possibilities that these two devices offer language teachers.

Difference between the iPhone and the iPod Touch

When comparing the latest models of the iPhone and the iPod Touch, one sees that, obviously,

one primary difference is that the iPhone has cell phone capabilities and the iPod Touch does not. Therefore, it would not be too much to say that the iPod Touch is an iPhone without cell phone capabilities. The design and dimensions are almost identical, which means it is not easy to quickly identify, simply by sight, whether the device being considered is an iPhone or an iPod Touch.

However, a closer look at both models reveals differences that extend beyond the cell phone capability. For example, one major difference between the iPhone and the iPod Touch is that the iPhone has a camera and the iPod Touch does not. Therefore, it is possible to take pictures or videos with an iPhone, even though it is not possible to do this with an iPod Touch.

Another difference is that the iPhone has an internal built-in microphone and the iPod does not. It is logical that the iPhone would have this because the primary function of an iPhone is its use as a cell phone. Basically, without the microphone, the iPhone could not be a phone. Though the iPod Touch does not have an internal built-in microphone, one can get around this by simply using headphones that also have a microphone.

Having considered how they differ, this discussion will now turn to a brief overview of the history of the iPhone's and iPod Touch's functionality.

History

The iPhone is a smartphone developed and sold by Apple Inc. It was first introduced on January 9th, 2007. The first generation of the iPhone was put on the market on June 29, 2007. The second generation iPhone was released on July 11, 2008 and the latest model, the third generation iPhone, was released on June 19, 2009. The new generation of the iPhone is faster than previous ones and it has additional functions not available on the previous models.

The first generation of the iPod Touch was released on September 5, 2007, shortly after the iPhone. The second generation iPod Touch was

released on September 9, 2008 and the third generation was released a year later on September 9, 2009. Just like the iPhone, with each upgrade, the hardware was improved to give the iPod Touch more power. Even with these upgrades, the basic functions of the iPhone and the iPod Touch remained almost identical except for the cellular phone capability.

Initially, the user was limited to only those functions that were built into the iPhone or iPod itself. However, in an exciting development, on June 11, 2007, Apple announced that third party applications would be supported on the iPhone. These applications make it possible to extend the capabilities of the iPhone/iPod Touch beyond those already built-in. Even with these extended capabilities, use of these applications is limited because the iPhone or iPod Touch needs to use the built-in web browser Safari when using these applications. Because of this, they cannot be used independently. This is likely why these types of applications are called Web Applications, often shortened as WebApps. Since Apple's announcement, many developers have created a wide variety of WebApps including many that are useful for language learning. Some of these WebApps will be discussed later.

In addition to Web Apps, Apple announced the release of the iPhone Software Development Kit on March 8, 2008. This opened up possibilities for third party companies to make independent applications to be installed on the iPhone or iPod Touch itself. These types of applications are shortened as Apps.

The difference between WebApps and Apps is in connectivity. WebApps are not independent applications because, as seen above, they need to be used through the iPhone built-in web browser Safari. While doing so, the iPhone/iPod Touch needs to be constantly connected to the Internet. On the other hand, Apps are independent applications that do not require the use of Safari, which means they do not require constant connection to the Internet while being used.

As this brief overview has shown, the iPhone/iPod Touch's capabilities fall into 3 basic categories: built-in functions, WebApps and Apps. In this paper, discussion of how the iPhone and the iPod Touch can be used for language teaching and learning will be divided into these three categories. The first discussion will be on how the built-in functions of the iPhone can be used for language learning. The second discussion will be on how to use WebApps for language learning. Finally, the last discussion will be on how to use Apps for language learning. Unless otherwise mentioned, hereafter the term "iPhone" will refer to both the iPhone and iPod Touch.

BUILT-IN FUNCTIONS APPLIED TO LANGUAGE LEARNING

There are two built-in functions for the iPhone that can be applied to language learning. One is the recording function and the other is the voice command. These two functions will be discussed separately.

Recording Functions

The recording function is one function where the differences between the iPhone and the iPod Touch show up. Two types of recording functions are possible. One is voice/audio recording and the other is video recording. As mentioned earlier, the iPod Touch is not equipped with a camera. Therefore, the iPod Touch cannot make any video recordings. However, voice recording is possible both with the iPhone and the iPod Touch.

The voice recording function is known as "Voice Memo." It is a relatively new function that was added to the iPhone with the release of version 3.0 of the iPhone Operating System on June 17, 2009, shortly before the release of the third generation iPhone. With this application, it is possible to make a voice/audio recording

using a simple interface whose icon is that of a microphone.

As for the other recording function, as stated earlier, the video recording function is only available with the iPhone. This function also uses a simple interface and is found under the "camera" application of the iPhone.

When considering these functions, it needs to be noted that almost all mobile devices sold nowadays have the capability of recording both voice and video. Therefore, it may not seem worth mentioning these functions here. However, it is not simply the functions alone that are worth noting. In fact, in conjunction with the voice and video recording functions, there are two related capabilities that are found in the iPhone but not in many other mobile devices. Combining the recording with these capabilities makes it worth noting in this discussion.

The first capability is trimming. With an iPhone, it is possible to "trim" a recording. For example, if there is unneeded and distracting noise at the beginning of a voice recording, it is possible to trim off that section of the recording. Trimming is also possible with the video recording. Trimming, thus, allows the user to edit the files to a limited extent

The second capability is the iPhone/iPod Touch's ability to directly send recorded files, both sound files and video files, as e-mail attachments. After a recording is made, a user can choose to "share" the files. For example, a sound file can be sent as an e-mail attachment in the m4a format. A video file, on the other hand, can be shared either by sending it as an e-mail attachment or it can be uploaded to YouTube.

Both recording functions can be used for language learning. For example, assignments such as "voice diaries" that use voice memo can be given. The student can be asked to make a recording of a "diary" entry and then asked to send the file directly to the instructor for comments/grading. Another example could be making an interview between the student and a native speaker of the

target language. Such an interview can be easily video taped using an iPhone and then sent to the instructor via e-mail directly from the iPhone.

Voice Command

Another built-in function that can be applied to language learning is “Voice Control.” The voice control function is the iPhone’s built-in voice recognition system. This function allows the iPhone to “recognize” what the user is saying into the iPhone. Currently, this function is limited to only being able to recognize what is already stored in the iPhone. For example, one of the functions of voice control is for making a phone call to a person whose name is already store in the iPhone address book or to a person by saying their phone number. If the user says “Call John Smith,” the iPhone searches the address book for John Smith and makes a call to that number. Likewise, if the user says “Call 555-5555,” the iPhone accesses its preprogrammed memory of numbers and makes a call to that number. Not surprisingly, this calling function is only available on the iPhone since the iPod Touch doesn’t have cell phone capability.

However, the voice control function is also used when playing music files stored on either the iPhone or the iPod Touch. Both the iPhone and the iPod Touch can play songs stored in them when the user says “Play songs by Mozart.” The user can ask the iPhone/iPod Touch “What song is this?” and the iPhone/iPod Touch will tell the user the title of the music.

Currently, voice command is available in the following languages: Chinese (Cantonese), Chinese (China), Chinese (Taiwan), Dutch, English (UK), English (U.S.), Finnish, French (Canada), French (France), German, Italian, Japanese, Korean, Norwegian, Polish, Portuguese (Brazil), Portuguese (Portugal), Russian, Spanish (Mexico), Spanish (Spain), Swedish.

Because it is available in a wide variety of languages, the voice command function can be applied to language learning for the practice of

pronunciation. Even though this function is limited to only recognizing one’s voice, a language learner can use this function to see if they are pronouncing numbers correctly in the form of phone numbers or to test to see if they are pronouncing names in the form of personal names stored in the address book or the titles of music. In fact, a learner can put a hypothetical name in the target language (such as a vocabulary phrase) in the address book without a phone number and then use this hypothetical name to see if he is pronouncing the words correctly. If the iPhone can recognize the hypothetical name, the learner knows that the pronunciation was correct.

Though this discussion has looked at two built-in functions as described above, there actually is another useful built-in function not mentioned so far: handwriting recognition. This function will be discussed later along with various web applications or applications with which it can become a useful language learning tool.

USING WEBAPPS FOR LANGUAGE LEARNING

Both the iPhone and the iPod Touch can be connected to the Internet. This ability extends the functions described above to broaden the ways in which these mobile devices can become language-learning tools.

The iPhone can connect to the Internet either by using a 3G network or Wi-Fi. The iPod Touch uses Wi-Fi for this purpose. Because both the iPhone and iPod Touch are different in many ways from computers, Apple has created specifications for developers to use when creating WebApps. Compared to a regular web page, WebApps need to be optimized for the iPhone’s size. Thus, WebApps are built to fit the 3.5-inch display. Apple has also set up web pages where the user can access these WebApps (<http://www.apple.com/webapps>) using a web browser, such as the built-in browser

Safari and other browsers, such as Opera, iCab etc., available for the iPhone.

Since WebApps require constant connection to the Internet, one possible disadvantage of WebApps is connectivity. If the user is in an area where no connection is available, it's not possible to access the WebApp.

Having noted this limitation, this discussion will turn to some of the many WebApps that can be used by language learners. The first example is the Google site itself. It is not necessary to do something special to access the Google WebApp site. Just clicking on the Google site icon on the iPhone automatically takes the user to the Google WebApp site. When the user accesses the Google site on the iPhone, the user may not notice that the site shows up on the iPhone as a special page designed for the iPhone. It's designed so that everything displayed will fit perfectly in the 3.5-inch display.

One useful function for a language learner at the Google WebApp site is the translation function. One simply types a word or a sentence in one language and it is translated into a different language just by tapping the screen. Even though this translation site is not unique to the WebApp (it is even available at the regular Google site), having translation ability on a device that one can easily carry in a pocket is quite handy and useful—especially when learning a second language.

Another example of a useful WebApp for language is that of a Hungarian Radio WebApp. This WebApp is available at this URL: <http://www.magyarportal.hu/>. As the name implies, one can access this WebApp and then listen to Hungarian radio stations on the iPhone. This site is particularly useful for those students who are learning Hungarian. Not only does this WebApp expose the learner to the Hungarian language, it also gives some exposure to the Hungarian culture as well.

A similar WebApp for other languages is Stitcher Radio at this URL: <http://stitcher.com/iphone>. This WebApp provides a variety of links to

various radio stations in a wide array of countries. Countries included in this WebApp are Japan, France, Australia, Germany, the United Kingdom, Ireland, Italy, Spain, Czech, Brazil. Those who are learning the languages spoken in these countries have easy access to authentic material just by tapping the iPhone screen.

Another useful WebApp designed specifically for Japanese language learners was made by myself and is called “gahoh for iPhone.” (<http://iphone.marinebat.com>). This WebApp shows the stroke order of *kanji* (Chinese characters) for the Japanese language. Because of the large number of *kanji* and the similarity between many individual *kanji*, incorrect stroke order can change the intended *kanji* to another that could then change the meaning of what is being written. Thus, when learning *kanji*, it is necessary to learn the correct order of strokes so that what one is writing is clear to the reader. This WebApp visually shows the correct stroke order and is available free of charge.

These are only a few of the WebApps available that could be used for language learning. More WebApps can be found by searching the WebApp pages for the ones that would best fit the reader's needs.

At this point, however, this discussion will turn from a discussion of WebApps to a discussion of Apps, the independent applications that can be installed onto an iPhone or iPod Touch.

USING APPLICATIONS FOR LANGUAGE LEARNING

As described earlier, applications for the iPhone/iPod Touch (shortened as Apps) are different from web-based applications (WebApps). Apps are independent applications downloaded to and installed onto the iPhone. Since these are independent applications, most of them do not require an Internet connection when being used. This is the major difference between WebApps and Apps. WebApps need constant connection to

the Internet, whereas most Apps do not require an Internet connection.

Apple announced that the number of iPhone Apps exceeded 100,000 on November 4, 2009. (<http://www.apple.com/pr/library/2009/11/04appstore.html>). It took a little less than one and a half years from its introduction for the number of Apps to reach this number (July 11, 2008 to November 4, 2009). Amazingly, it took only an additional 6 months for this number to double to more than 200,000 (November 4, 2009 to April 8, 2010).

With this many number of Apps, it is necessary to know how to look for the Apps one wishes to find. Thus, before turning to a discussion of specific Apps that can be used for language learning, this discussion will briefly look at how one can find the Apps that best fit one's needs.

There are several ways to look for Apps that are useful for language learning. First, one could simply go straight to the iTunes store or one could use Google search to find a particular App. However, if one does choose to go to Google search and do a search for the description of the App that one is wanting, in the end the search will take the user to the "App Store" in iTunes. The reason for this is that all Apps must be downloaded at the iTunes store.

When using an iPhone, accessing the App Store is performed by tapping on the "App Store" icon. When one "arrives" at the App Store, one sees that Apps are classified into various categories. Examples of such categories are Entertainment, Finance, Games, News, Productivity, Reference, Social Networking, Travel, Utilities, etc. For a search for language learning software, probably the most effective way is to first go to the "Education" section of the App Store. Once in the education section, one has more categories to choose from: "Top Paid," "Top Free," and "Release Date." As the name implies, the "Top Paid" section lists, in the order of popularity, the Apps which a user needs to pay for in order to download. The "Top Free" section lists the Apps, again in order of popularity, that a user can download free of

charge. Finally, in the "Release Date" section, the Apps are listed from newest to oldest regardless of popularity. After choosing from these three sections, the method for searching is simple. The user simply browses the Apps found there to see what is available until one finds something of interest. Admittedly, this method is probably not the most efficient method for finding a specific type of App. In spite of this, the advantage of this method is that the user can become familiar with the sort of Apps found in each section.

Another way is to use the search function. This is especially efficient if one knows what one is looking for or has a fairly clear idea of what type of software one wants to find. For example, if the user is looking for software to learn the Japanese language, the user can input the keyword "Japanese" into the search field and then search the Apps. In this case, any App tagged as "Japanese" will show up. Because this could end up with a rather large selection, it is possible to narrow down the search by adding additional key words to the search. Thus, if the user does not want to have to pay for an App, the keyword "free" can be added to the search. Thus, the user would enter "Japanese free" and then search for Apps that are tagged both "Japanese" and "free." (In fact, this adding of the word "free" as a key word to any search is a very nice way to narrow down the search to "free" Apps.) In this example, one might wonder how many Apps would appear under a search of "Japanese Free." At the time of this writing, a search using the key words "Japanese free" came up with eighty-eight Apps. Once one has narrowed down the search, one can then start browsing each App to get more specifics on what each has to offer. As would be expected, narrowing down the search like this is a much more effective way to search for Apps than simply browsing the entire "Top Free" section of the "Education" category because the only Apps shown will be those that are tagged as both "Japanese" and "free."

Now that it is clearer how one can search for and find Apps that best fit one's needs, this

discussion will look at what Apps are useful for language learning in particular.

The first example that will be looked at is an App that is of particular use to Japanese Learners. This App is called “Japanese Phrases Free.” It is located at the following url: <http://thejapanesepage.com/iphone> Here is a brief description of “Japanese Phrase Free.”

“Japanese Phrase Free” is, as its name implies, a free App that enables a learner to study Japanese independently. When one opens up this application, one notices that there are eight modes: “Lessons,” “Study Cards,” “Flashcards,” “Quizzes,” “Study Bank,” “Search,” “Random,” and “Omise.”

By tapping on “Lessons,” a learner can study the basics of Japanese. When one does this, one sees that the “Lessons” section is divided into five sub-categories: “Getting Started,” “Hiragana,” “Katakana,” “Grammar Fast Track 100,” and “Other Lessons.” The “Hiragana” and “Katakana” sections provide the stroke order and sound for each character as well as sample vocabulary using the character. The grammar section gives basic grammar lessons such as basic word order, verbs, and particles. Using the “Lessons” section allows the learner to progress through a series of lessons that are already set up.

If one goes to the “Quiz” section instead of “Lessons,” the user can self-test on hiragana, katakana, and vocabulary. In fact, “Japanese Phrases Free” has a large bank of vocabulary and phrases, such as basic greetings, conversation phrases, weather-related vocabulary, food related vocabulary, numbers, time. Sound files have been prepared for both the phrases and the vocabulary found in this App. As one might imagine, this makes this App a useful vocabulary resource.

It is interesting to note that most language learning Apps found in the App Store have the basic format as that for “Japanese Phrases Free” described above. They have phrases and vocabulary with sound, usually with a quiz mode making it possible to self-test what has been learned.

Another example of a language learning App in a different language is “Free German Essentials by AccelaStudy®.” This can be found at the following url: <http://www.accelastudy.com/>. This App is essentially a large set of vocabulary flash cards. This company has free language learning applications for the iPhone in the following languages: Arabic, Chinese, Dutch, French, German, Greek, Hebrew, Italian, Japanese, Korean, Polish, Portuguese, Romanian, Russian, Spanish, Turkish, and Ukrainian. Almost every language has a similar structure in the lessons. Each language has approximately 150 words with sounds. In the “Study” mode of the German version cited above, each German word is shown with an English translation along with a sound option to show pronunciation. In the “flashcard” mode, the English word shows up and, once the user taps on the screen, the German word appears. In the quiz mode, there are two options. One option is a quiz without sound and the other is a quiz that uses sound. For each quiz, the English word shows in the top half of the screen. At the same time, four German words show in the bottom half of the screen from which the user picks the correct word. If the user does not get the answer correct, the user can keep working on the word until the answer is found. As was the case with “Japanese Phrases Free,” the user can simply download the application from the iTunes store and start learning the language.

The above two applications, “Japanese Phrases Free” and “Free German Essentials by AccelaStudy,” are, as their names imply, free applications. Like these two examples, most free applications for language learning are limited in the number of vocabulary, grammar points, etc. that are included. Many of these free Apps have a paid version usually available from the same company as that which produces the free version. Paid versions generally have more vocabulary, grammatical patterns, and more functions available. For example, “Japanese Phrases Free” has about 450 words and phrases.

However, the paid version of “Japanese Phrases” has about 2,700 words and phrases.

There is an advantage to downloading the free version of a paid application first. Doing so enables a user to experience the application before paying for it. After trying out the free version of the application, if one finds this App meets one’s particular study needs, then one can download and purchase the paid version of the application.

The Apps described above are applications to which a user cannot add anything. Everything is pre-programmed, meaning it is not possible to add vocabulary, grammatical patterns, etc. Pre-programmed applications are useful when a user is learning a language independently. However, for those individuals who are taking language courses at an institution, such as a university, high school, etc., it is more beneficial if an App can provide additional practice on the same set of vocabulary, grammar, etc. as those that they are studying in the classroom.

This discussion will now look at a few examples of applications that a user can customize, by adding information to the App so that the App’s content goes along with what is being taught in the classroom.

The first example of a “customizable” App is “Wordbook free” which can be found at the following url: <http://www.sonoran.co.jp/iPhone/fcards/en/>. This is a virtual flashcard App. This application has the look and feel of real flashcards. When the application is downloaded to the iPhone and opened, what the user sees first are virtual rectangular cards with a virtual O-ring tied to these cards. The user first sees a sample stack of flashcards. In the sample, there are 12 cards of fruit vocabulary in the form of Japanese - English flash cards. When the user taps on the iPhone screen, the card flips to show the other side. The user can “flip” the sides of the flashcards and reserve the questions and answers to review later by tapping the “A & Q” section of the screen. This App also has a mode that will randomize the order each card shows up. It is also possible to give each

card a rating (from one star to five stars) so that the order of the cards can be from the highest rating to the lowest rating or vice versa. A user can use this function to label the “memorized” vocabulary with five stars, and “not memorized yet” vocabulary with one star. Then when the user decides to use the cards, the user can start with one star vocabulary to practice. This App also has an automatic mode so that the cards can be flipped at a regular intervals, ranging from one second to ninety-nine seconds.

As mentioned above, this App is also an example of an App that is customizable. It is customizable because a user can add items to make new flash cards. For example, a user can add vocabulary for the current lesson being covered in a class by creating a new stack of cards. This function of customization is not a function found in the previously discussed “Japanese Phrases Free” and “Free German Essentials by AccelaStudy®.” Depending on how a user intends to study, the ability for customization is very useful. If a learner is simply trying to memorize the vocabulary that comes with the App, such as “Free German Essentials by AccelaStudy®,” the customization function is probably not necessary. However, if a user intends to use the App free as supplemental material for coursework, the function of an App such as “Wordbook free” that allows one to be able to add cards is a very nice function indeed.

Since this is a free application, the available functions are again limited compared to the paid version. With the paid version of the application, which is called “Wordbook,” it is possible to make the user’s own data with a Macintosh computer, import it to the iPhone and then also possibly share it with other users.

A second example of a customizable application is gFlash. <http://www.gwhizmobile.com/Desktop/gFlash.php>. The basic function of gFlash is similar to that of Wordbook. It is a set of virtual flash cards for the iPhone. However, gFlash doesn’t have the physical appearance and feel of flashcards as was found in Wordbook.

On the other hand, gFlash has more functions compared to Wordbook. For example, gFlash can include graphic files. This means it is possible to make a card that shows a picture and identifies the vocabulary used for it in the target language. This function is particularly useful when the item in the picture is culturally unique and not quite possible to translate into another language. In addition to the regular flash card mode where one looks at one side and then “flips” to see the other side of the cards, gFlash has a multiple choice mode. Instead of simply one to one corresponding “flipping cards,” with gFlash it is possible to have four possible selections to choose from for one card. The user clicks on the “correct” answer and gFlash keeps track of the answers so that the score of correct answers can be shown at the end of the multiple-choice mode. Another function of gFlash is to create flash card data with computers and then make it available to other people. With the previously introduced “Wordbook,” in order to create data with a computer and make it available to other people, it is necessary to purchase the paid version of the application. However, with gFlash, it is not necessary to purchase the paid version. The author of gFlash made a template to make the flashcard data available at Google Docs. Anyone with a Google Docs account can freely access the provided template, use it to create their own flashcard data and then make that data accessible to others.

The paid version of gFlash, called “gFlash Pro,” has additional functions to those described above. The paid version enables a user to add sound files to the flash cards. With this, it is possible to listen to the sound file and then choose the corresponding word. Another media that is included with the paid version is YouTube video. Here the user can include video files to a flash card to make the flashcard fully audio-visual. This video capability clearly opens up doors for new possibilities for flashcard exercises.

USING APPS TO BOOST BUILT-IN FUNCTIONALITY

So far, this discussion has looked at Apps that are installed and that provide new functionality to the iPhone. This discussion will now turn briefly to a look at Apps that boost the built-in functionality of the iPhone.

Voice Recognition Function

As previously discussed, the iPhone has a built-in function for “Voice Control.” However, as was seen, this function has some limitations. There are Apps that provide the user with more voice control capability than that provided with the built-in function of iPhone. Language learners can make great advantage of iPhone Apps being able to understand the spoken language. They can test if they are pronouncing a word, phrase, or sentence correctly.

An example of voice recognition function is Google Mobile App. Please note that the Google Mobile App is different from the aforementioned Web App. The Google Mobile App is an independent application. This app has a voice search function. Instead of typing the word or sentence the user wishes to search for, the user speaks the word or sentence and the voice recognition system recognizes what was spoken. For example, a user might say, “Where is the capital of Japan?” The Google Mobile App will analyze what was spoken and then transcribe what was spoken before showing the search results. The voice search function is available in three languages, English, Japanese and Chinese. A beginning student can start with pronouncing just one word to test if their pronunciation is good enough to be recognized by the application. When the student feels that their basic word level pronunciation is comfortable, then that student can move up to a short sentence level to test out their accuracy of pronunciation.

Another example of a similar App is “*Onsei Ninshiki Mail*” (Voice Recognition Mail). This

App can be found at: <http://iphone.amivoice.com/iPhone/ASRMailST/index.html> This is a Japanese voice recognition software. There are two versions available, one is a free version and the other is a paid version. The difference between the free and the paid version is that with the free version, it is not possible to copy-paste sentences recognized by this App to other applications on the iPhone. Here is a brief description on how to use this App. The user speaks to the iPhone with this application using the natural speed of speech. The App then analyzes what was spoken and transcribes that into sentences. This application is useful for learners of Japanese because it allows them to self-test to see if their pronunciation of Japanese is correct or not. A noteworthy ability of this application is that the accuracy of recognition is higher when the sentence is spoken close to the natural speed used by a native speaker. For example, for this application to recognize “*Ohayougozaimasu*” (Good Morning) easily, one needs to say the words as naturally as possible. The level of accuracy will go down when the user speaks too slowly or puts a pause between syllables, such as “*O-ha-yo-u-go-za-i-ma-su.*” However, when the phrase is spoken at a natural speed without any pause, the level of accuracy with this application goes up. Thus, if a learner uses this App to practice pronunciation, that learner is encouraged to speak as naturally as possible in order to allow the App to recognize what is being spoken. The user can tell if their pronunciation and speed is fine when the application clearly recognizes what was spoken.

Another example of voice recognition software is “Jibbiggo Speech Translator.” This App can be found at: <http://www.jibbiggo.com> This App is a bidirectional translation software of spoken language. Currently, the bidirectional translation is of English to/from Spanish, English to/from Japanese, English to/from Chinese and English to/from Iraqi/English. There are no free versions of these Apps. Everything available comes in the form of a paid application.

The purpose of this App is to allow someone with no knowledge of Japanese, Chinese, etc. to speak with an English speaker. The App understands the spoken language, analyzes it and translates what was spoken. For example, a Japanese speaker speaks Japanese into an iPhone. Then, the App analyzes what was spoken, translates the sentence, and speaks what was translated in English. An English speaker listens to what was spoken by the iPhone. Then, after hearing the English translation, the English speaker replies in English. The iPhone translates and the translation comes out from the iPhone’s speaker in Japanese. The conversation can continue like this with the mediation of the iPhone using the Jibbiggo App.

Even though the main targeted use of this software is not for teaching a language learner, this App can be used in various ways for language learning. Language learners can use this application to practice their pronunciation because the media requires this App to understand spoken language. If a language learner practices using this App and the target language is spoken with too much foreign accent, the App will not understand what was spoken. This forces the learner to improve their pronunciation. The learner can begin with simple words and, once the learner has reached the point where they are able to produce sentences, this App can then be used to test if the sentences the learner produced can be correctly understood.

Earlier in this discussion, it was mentioned that a third built-in function could be used with WebApps or Apps to make the iPhone a useful instructional tool. That built-in function was the handwriting function. It is to this function and the Apps required that this discussion will now turn.

Handwriting Recognition Function

As stated earlier, the iPhone has a built-in function for recognizing handwriting, specifically handwritten Chinese characters. The ability to recognize handwritten Chinese characters is particularly

useful when one is learning characters different from the Roman alphabet, such as Chinese and Japanese (because Japanese uses Chinese characters in writing). This built-in function is one of the available input methods for typing Chinese. By default, the Chinese handwritten character recognition function is turned off. To enable this function, one needs to go to the “Keyboard” section of the “Settings.” Once this function is enabled, when a user puts the iPhone into the typing mode, the writing palette shows up. When the writing palette is on the screen, the user can start writing by hand a Chinese character. As the user does this, the iPhone starts recognizing what is being written and displays four possible Chinese characters based on what was written. By using this function, a learner can test if one can write the Chinese characters correctly. In order for this handwriting capability to correctly recognize the Chinese characters, the user needs to follow the correct stroke order. Similar to learning to write Japanese *kanji*, when learning Chinese characters, it is important to learn the correct stroke order so that the character looks well proportioned and is easily understandable.

In a classroom setting, instructors of Chinese do not really have an easy way to check if a learner is following the correct stroke order unless the instructor looks at how the character is written at the exact moment each learner is writing the character. This method is unproductive and time consuming. It is not possible to perform this checking for all students in class because each student will need to write each character in turn which will waste a considerable amount of class time for those students not writing. However, using the handwriting recognition function of an iPhone makes it easy for a learner to self-check to be sure the correct stroke order is being used. If the iPhone can correctly recognize the characters written, the learner knows that the correct stroke order was used.

As stated earlier, the built-in handwriting character recognition is only available for Chinese.

Even though Japanese shares Chinese characters in its writing system, there is no built-in handwriting character recognition function for Japanese on the iPhone. However, there are some Apps whose function is to recognize handwritten *kanji*. (*Kanji* refers to Chinese characters used in written Japanese and is used here to distinguish these from the Chinese characters used for written Chinese.)

One example of such an App is *Kanji Sensei*. This App can be found at the following url: <http://www.fatefulsoftware.com/>. This App is free so there is no paid version. This App has two modes: a reading tutor and a writing tutor. In the reading tutor mode, *kanji* show up with three choices in meaning displayed in English. The user taps on the correct meaning. When the choice is correct, the user hears a chime and then moves on to the next *kanji*. In the writing mode, a *kanji* with light gray color shows on the screen. The color of the *kanji* changes as the user traces the light gray line. When the user traces the *kanji* with the correct stroke order, they hear a chime and the next *kanji* shows up. The purpose of this writing tutor mode is to help one learn the correct stroke order for writing *kanji*. Therefore, when the stroke order is incorrect, the user hears a buzzer instead of the chime. This App is free to download, however, the number of *kanji* a user can practice is limited. The number of *kanji* available with this application is approximately 150 *kanji*. Considering the number of *kanji* taught in Japan for a first grade student is 80 and the number for the second grade student is 160, the number of *kanji* built-into “Kanji Sensei” is rather small. An App with a larger number of *kanji* is available, even though it’s a paid App. “ShinKanji” (<http://shinkanji.bcerrina.com/>) contains approximately 3,200 *kanji* with their respective stroke order.

Another useful way to use iPhone with *kanji* is to use the iPhone as a *kanji* dictionary. Using an iPhone as a *kanji* dictionary is a totally different experience compared to using traditional dictionaries. Using the old fashioned method (a regular paper-bound dictionary) is very time consum-

ing—especially when the user needs to look up a *kanji* that they have no idea how to pronounce. If the user is familiar with the pronunciation of the *kanji*, an alphabetical index can be used to find the *kanji*. However, if the user has no idea as to how to pronounce the *kanji*, the choices are limited. In the traditional method, to do this one needs to first count the number of the strokes of the *kanji*. Then one needs to go to the index that classifies each *kanji* by the number of strokes. From there one can look up the *kanji* in question. However, an error in counting the number of strokes could easily occur. This results in a situation where the user could be searching for the *kanji* in a totally different section of the dictionary. Unlike the cumbersome method described above, using an iPhone as a *kanji* dictionary is much easier and can prevent this kind of error happening.

“WishoTouch” is a *kanji* dictionary App for the iPhone. This App can be found at the following url: <http://sazanamisoftware.com/wishotouch/> Even though this is a paid App, having this App on the iPhone adds the functionality of being able to use the iPhone as a *kanji* dictionary. This application has 6,355 entries of *kanji*. This number is more than enough in order to look up *kanji* used in daily use because the number of *joyo kanji* (the guide of daily use *kanji* announced by the Japanese Ministry of Education) is 1,945 (one-third of the entries found in this App). With this App, the user can look up *kanji* in various ways. One way is to handwrite the *kanji* in question. The application recognizes what is written on the iPhone and gives 14 possible *kanjis* for what was written. The App searches for these while the user is writing the *kanji*. This means that, even though the entire *kanji* has not been written yet, the App shows the possible *kanji* with what is written so far at the bottom portion of the screen. Therefore, one does not need to finish writing the whole *kanji*. If the correct *kanji* appears, one just taps on what is shown as a choice. This will take one to the correct page with the information on the *kanji* chosen can be found. This information

includes data related to the chosen *kanji* such as its possible meanings and pronunciations. Other methods that can be used are somewhat similar to that described for using the traditional *kanji* dictionary. With this App, it is still possible look up *kanji* by the radical, the number of strokes, meaning, and the pronunciation. It is also possible to look up *kanji* by the grade level it is taught in school. In fact, in a reflection of the current computer age, it is even possible to look up a *kanji* by using the Universal Coded Character Set. This App can also be used as a Japanese - English, English - Japanese dictionary because it includes more than 148,000 searchable words.

Even though “wishoTouch,” is very a useful application, it is a paid App. As of June 2010, the cost is \$19.99. On the other hand, even though it is still under development, there is a free *kanji* dictionary App whose functions are quite similar to the *kanji* dictionary part of “wishoTouch.”

UPal: *Kanji Dictionary*, <http://www.sp.cis.iwate-u.ac.jp/icampus/u/akanji.jsp>, provides the function of a *kanji* dictionary without any charge. This App is still under development and still only a WebApp as of June, 2010, which means it requires an internet connection to use. However, the ultimate goal of this project is to create an independent application for the iPhone to be able to search *kanji* using handwriting recognition capability. The handwriting recognition portion has not been finalized yet, which means that, currently, a user needs to enable the Chinese handwriting function built into the iPhone. Even without enabling the function for recognizing handwriting, this WebApp is useful. With this WebApp, after the *kanji* is found, the search result shows the number of strokes, the stroke order, pronunciations, and the radical. The user can select the language in which the meaning of the *kanji* is shown out of the 22 available languages from the pop-up menu.

This WebApp also includes a quiz function where the user tries to match the *kanji* on the left side to the pronunciation and meaning on the right side.

It is also possible to keep track of the scores of quizzes if the user sets up a free account for this WebApp.

CONCLUSION

At this point in time, the use of mobile devices such as the iPhone and iPod Touch is relatively new to language learning. However, this does not mean that an innovative teacher should not look to these devices as potential instructional tools. In order to do so, it is vital that the instructor understands what some of the options currently available are. It is also vital that the instructor understands how to search for and find those WebApps and Apps that could be used in the particular course, which that instructor is teaching.

This paper looked at some of the available Apps and WebApps and how they could be applied to language learning. It also looked at how one can effectively search for new tools that might be developed as well as other tools not described in this paper. It is the author's wish that readers will continue the exploration of the possibilities even further in order to find all possible WebApps and Apps that fit their language needs.

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ENDNOTE

The author is not affiliated with Apple nor any of the commercially available applications discussed.

Chapter 10

Combining the Body and Mobile Technology to Teach English Pronunciation

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ABSTRACT

In Australia, postgraduate international student enrolments have risen 81 per cent since 2002. In 2008, 74 per cent of international enrolments were in Business/Management, Computer Science and Engineering-related courses (Davies, 2010). Most international students are from Asia, and the vast majority of those from mainland China. A survey of employers in 2006 found that employers rated interpersonal and communications skills (written, oral, listening) far above “qualifications” and “previous employment” as the most important selection criteria when hiring graduates (Davies, 2010). In fact, research on the IELTS levels of exiting Master’s degree students suggests that international students at Australian universities tended to graduate with worse spoken English skills than when they first entered.

The above research has identified a deficiency in the communication skills of international students, crucial in seeking employment. This chapter proposes various ways of helping committed international students on campus to improve their spoken English language by combining the use of the students’ bodies with mobile technology.

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INTRODUCTION

According to Davies (2010), in Australia, post-graduate international student enrolments have risen 81 per cent since 2002. In 2008, 74 per cent of international enrolments were in Business/Management, Computer Science and Engineering-related courses. Most international students are from Asia, and the vast majority of those from mainland China. International students from China have been increasing 8 per cent since 2007. A worrying development is the decline in the employment success of international students, attributed largely to the inadequate English language skills of graduating students. In fact, research on the IELTS levels of exiting Masters students suggests that international students at Australian universities tended to graduate with worse spoken English skills than when they first entered (Birrell, 2006). As reported in Davis (2010), a survey of employers in 2006 found that employers rated interpersonal and communication skills (written, oral, listening) far above “qualifications” and “previous employment” as the most important selection criteria when hiring graduates (57.5 per cent, 35.4 per cent and 27.6 per cent respectively).

The above research has identified a deficiency in the communication skills of international students. One of the communication skills is obviously spoken English. However, in English language programs, spoken communication skills such as pronunciation has been marginalized for many years even in communicative language teaching (CLT) programs (Gatbonton & Segalowitz, 2005). This is further compounded by many English language teachers’ lack of confidence in teaching the skill (Breitkreutz, Derwing, & Rossiter, 2001; Macdonald, 2002) despite the abundance of teaching materials available. Furthermore, the debate between what aspects of English pronunciation are more important to teach and what level of competency L2 learners should realistically aim for are still going on. For instance, research by Derwing and Munro (1997) and Derwing,

Munro and Wiebe (1998) suggest that although second-language users are often able to modify their pronunciation to the extent that native listeners find their productions significantly easier to understand, total elimination of an accent is not a realistic goal. Otlowski (1998) and Fraser (1999) concur with much of the current research and suggested that the goals of pronunciation teaching should be “developing functional intelligibility, communicability, increased self-confidence, the development of speech monitoring abilities and speech modification strategies for use beyond the classroom” (p. 3).

While the goal of pronunciation teaching and learning has moved from that of native-like pronunciation (as in the audio-lingual approach), to intelligibility (Celce-Murcia, Brinton, & Goodwin, 1996; Kenworthy, 1987; Morley, 1994), the comments of teachers on the coal face in Macdonald’s study (2002) indicate that what intelligibility means and how it is measured are not clear. Intelligibility is therefore defined as the extent to which speech signal produced by the speaker can be identified by the listener as the words the speaker intended to produce. This definition is similar to that used by Field (2005, p. 401): “the extent to which the acoustic-phonetic content of the message is recognizable by a listener,” and to the term ‘phonological intelligibility’ used by Jenkins (2002, p. 86). Intelligibility is a complex construct that is also tangled up with different views, personalities and experiences. Nevertheless, it is a concept pivotal to examination of learner goals and assessment for pronunciation.

With regards to what aspect of English pronunciation to focus on (i.e. segmental or suprasegmentals) some studies of international teaching assistants’ (ITAs) speech found correlations between using suprasegmentals accurately and speaker intelligibility. Tyler, Jeffries, and Davies (1988) studied the discourse of ITAs whom undergraduates perceived as disorganized and unfocused. They found that these ITAs used too many pauses, too many primary stresses per mes-

sage unit, and inappropriate falling intonation. The study conducted by Gallego (1990) also found that communication breakdowns were usually caused by pronunciation errors in word stress in ITAs' speech. Other research has suggested that a number of suprasegmental features such as wave duration and wave peak amplitude (Constantinou, 1993), word stress (Bansal, 1969), and the interstress interval (Anderson, 1993) affect intelligibility. Jenkins (2002) examined communication breakdowns of nonnative to nonnative speech, and found "a combination of phonological errors which caused the most serious problems in [her] data: misplaced tonic (nuclear) stress along with a consonant substitution within the wrongly stressed word" (p. 89). Morley (1991) and Fraser (1999) further call for a learner perspective in English pronunciation teaching through supporting a learner-centered approach that involves authentic tasks and the use of peers and groups for interaction and feedback to help learners be critical listeners and develop the ability to notice and repair their own and others' errors. Schmidt (1995), in a comprehensive survey of psychological studies, has also argued that second-language (L2) learners need to have their attention drawn to specific characteristics of a language if they are to make changes in their own productions. This chapter proposes such an approach in which a number of computer enhanced technologies including mobile technology are also called into service.

LITERATURE REVIEW

Correcting non-native speakers' English is not easy to accomplish. First of all, it is necessary to identify what errors L2 learners of English from different nationalities are making. Then, strategies for correction are needed, and because language use is essentially individualistic, somehow, the L2 learners of English need to know how to correct the errors themselves (Fraser, 1999).

In terms of identifying errors made by L2 learners of English from different nationalities, extensive research in linguistics, contrastive analysis, applied linguistics and spoken language technology for education (SLATE) have provided many useful clues (Ehsani & Knodt, 1998). Books describing L2 learner errors in English detail L2 learners' errors from different nationalities (Swan & Smith, 2001). However, pronunciation teaching is still rarely integrated into mainstream English language classes and, at best, occupies a marginalized position within the curriculum (Macdonald, 2002).

Recognizing the marginalization of pronunciation classes alerts us to the gap between research literature on pronunciation and classroom realities. For instance, many of the practices which were supposedly evidence-based, arose from research done in linguistics and SLATE. The research was usually carried out under controlled experimental conditions, for instance, selecting L2 learners from the same nationalities. Interesting as this may be, English classroom reality in Australia is that classes are likely to be composed of multiple nationalities, and this would cast doubt on the applicability of research findings obtained under controlled experimental conditions.

Macdonald's research on reasons why ESL teachers in Australia were reluctant to teach pronunciation also provided us with some reasons why English pronunciation teaching has been marginalized. He also made a number of recommendations (Macdonald, 2002). The two that will be discussed in details in this chapter are (i) how to provide teachers with guidance to teach students to set goals for themselves; and (ii) how to redefine the teacher's role with regard to pronunciation as that of a speech coach responsible for monitoring student speech and encouraging student self-monitoring.

The Role of Technology in Teaching English Pronunciation

Computer technology plays a central role in teaching English pronunciation. One is in its ability to assess non-native pronunciation and the other is through the use of computer assisted language learning programs to teach English pronunciation. Central to both is the development of automatic speech recognition (ASR) technology.

Computer Pronunciation Teaching Program

ASR has been used to construct computer assisted pronunciation teaching programs (CAPT) for a long time. Early ASR-based software programs, such as Talk to Me (Auralog, 1995), the Tell Me More Series (Auralog, 2000), Triple- Play Plus (Mackey & Choi, 1998), New Dynamic English (DynEd, 1997), English Discoveries (Edusoft, 1998), and See it, Hear It, SAY IT! (CPI, 1997) adopted template-based recognition systems which perform pattern matching using dynamic programming or other time normalization techniques (Dalby, J. & Kewley-Port, 1999). Neri, Cucchiarini, Strik and Bove (2002) criticized the graphical wave forms presented in products such as Talk to Me and Tell Me More because they look flashy to buyers but do not give meaningful feedback to users.

Even though, ASR technology has improved a great deal in the last ten years, most ASR engineers admit that the current accuracy level for a large vocabulary unit of speech (e.g., the sentence) remains less than 90%. For instance, Dragon's Naturally Speaking or IBM's ViaVoice, for example, show a baseline recognition accuracy of only 60% to 80%, depending upon accent, background noise, type of utterance, etc. (Kim, 2006). As cited in Kim (2006), "more expensive systems, Subarashii (Bernstein, J., Najmi, A., &

F., 1999), EduSpeak (Franco, Neumeyer, Kim, & Ronen, 2001), Phonepass (R. Hinks, 2001), ISLE Project (Menzel, Herron, Morton, Bomaventura, & Howarth, 2001) and RAD (CSLU, 2003) are reported to outperform these two."

These ASR driven programs use the Hidden Markov Model (HMM) algorithms to deal with large units of speech (Ehsani & Knodt, 1998). That is, a speech recognizer based on HMM computes how close the phonemes of a spoken input are to a corresponding model, based on probability theory. High likelihood represents good pronunciation; low likelihood represents poor pronunciation (R. Hinks, 2003; Larocca, Moagan, & Bellinger, 1991).

More recent ASR programs that have adopted HMM such as FluSpeak (IBM ViaVoice recognizer) also measures intonation. However, as Kim (2006) pointed out since intonation refers to low or high pitches in a sentence, it is extremely difficult to register intonation using only a sound wave. This is because the value of pitch in a high tone is small (narrow), whereas that in a low tone is large (wide). An additional problem arises in that the value of pitches varies depending on the individual speaker. Thus, it is difficult to determine the degree of correct intonation for different people based on the absolute value of pitch in a sample.

Pronunciation Assessment

Since the 1990s Automatic Speech Recognition technology has been used firstly to assess non-native pronunciation. Zechner, Higgins, Lawless, Futagi, Ohls, & Ivanov (2009) have devised an automatic scoring method for use in rating the TOEFL iBT Practice Online product. They use a recognizer trained on a combination of American native (Broadcast News) and non-native speech that produces word identity, timing and confidence scores. Scoring of a non-native speaker's English speech is based on best fit to their human gold

standard (i.e. the judgment of a set of human listeners who are often experts in some aspect of language learning, such as classroom teachers or heads of national testing groups). Other similar speech assessment tools also exist commercially such as the Pearson Test of English (Academic) (Pearson, 2009). Pronunciation assessment of this kind is based on the judgment of speech on its natural flow (use of pauses, rhythm, use of pitch, etc.), overall correctness of articulation and other criteria that give the listener the impression of fluent communication. In tests of this kind, the mastery of suprasegmental characteristics of English is essential in L2 speakers of English being perceived as intelligible speakers of English.

The CAPT systems reviewed above are less likely to provide us with reliable measures the suprasegmental aspects of English pronunciation and yet L2 speakers are increasing being tested on the suprasegmental aspects of English pronunciation. This makes them unsuitable as the sole means of teaching English pronunciation. However, many institutions and teachers will use commercial CAPT programs to ‘take care’ of the teaching of English pronunciation. No matter how advanced or accurate CAPT systems are, it is difficult to build in the feedback, instructions that students can act upon.

In this chapter, I would like to propose a method of teaching English pronunciation which teaches L2 learners how to set learner goals (Macdonald, 2002, recommendation 2) and learn to self-monitor and how to train English teachers to integrate the teaching of English pronunciation in their classroom and develop the ability to monitor L2 students’ pronunciation (Macdonald, 2002, recommendation 3) with and without the use of CAPT technology. The technology used in this approach includes cd roms, speech analysis tool and the Smart Pulse Pen by Livescribe (<http://www.livescribe.com>).

TOWARDS AN EMBODIED APPROACH TO THE TEACHING OF ENGLISH PRONUNCIATION

In Australia, a large majority of L2 students in ELICOS centers want to undertake degree studies in universities. Therefore, they need to fulfill entry requirements such as that for English proficiency. The most commonly used test of English proficiency is the IELTS test. In the IELTS test, the teaching of speaking skill in English comprises of the teaching of fluency and coherence, lexical resources, grammar range and accuracy and pronunciation according to the IELTS Band Descriptors (University of Cambridge ESOL Examination Board, 2010). Fluency is a commonly used notion in foreign language teaching and yet it is a concept that is difficult to define precisely. Even without its precise definition, fluency continues to be one of the aspects of spoken English tested on most common descriptors of oral performance in English. The Concise Oxford Dictionary defined fluency in a language as “smooth, rapid, effortless use of language.”

This view of fluency has been accepted in the definition of fluency according to IELTS speaking skill band descriptors which states that at Band 7:

- speaks at length without noticeable effort or loss of coherence
- may demonstrate language-related hesitation at times, or some repetition and/or self-correction
- uses a range of connectives and discourse markers with some flexibility’

Intelligibility only appears in the descriptor at Band 8 and 9 under pronunciation in the form of ‘Pronunciation is effortless to understand.’ and ‘Pronunciation is easy to understand throughout, L1 accent has minimal effect on intelligibility.’

Since in most institutions, the minimum entry requirement for university students is IELTS overall score of 6.5 which includes the speaking

skill, then we need to integrate both fluency and intelligibility activities in pronunciation teaching. What kind of language do we select to teach?

Going back to the IELTS band description, exactly how can we develop in L2 learners' the ability to speak at length without noticeable effort or loss of coherence? To answer this question, we need to first discuss what kind of language we need to select to teach and then investigate how to teach these target features.

Many studies have been conducted to investigate, from a listener's perspective, what aspects of L2 learners' English affect comprehension in native speakers of English. Anderson-Hsieh and Koehler (1988) found that prosodic deviance may affect comprehension more adversely than segmental deviance. Zielinski (2006) provides some discussion of other studies that have attempted to identify features contributing to intelligibility. Romova, Smith and Neville-Barton's work (2008) also correlates with that of Anderson-Hsieh and Koehler (1988). However, the issue of what factors impact most on listeners' intelligibility is far from conclusive (T. M. Derwing & Munro, 1997; Munro, 1995a #398). Recent work on a group of international teaching assistants (ITAs) (Hahn, 2004) found that primary stress or sentence stress is a major factor influencing the intelligibility of ITAs' speech and that native English speakers could recall significantly more content and could process the discourse more easily if these characteristics of the language are correct. This also led to a positive evaluation of the L2 speaker. In spoken conversation, intonation and stress information not only helps listeners to locate phrase boundaries and word emphasis, but also to identify the pragmatic thrust of the utterance (e.g., interrogative vs. declarative).

Grosjean and Gee (1987) argued that the rhythmic properties of the speech signal are important for listeners and hypothesized that listeners use strong syllables to initiate a search for words in that minds. Research on the process by which native English listeners derive a sequence of

words from a stream of connected speech indicated that the rhythmic properties of the speech signal are also important to native speakers of English as they draw on these properties to divide continuous speech into individual words and to recognize what the individual words are (Cutler & Butterfield, 1992).

The research reviewed above is in general agreement that sentence and word stress are important for intelligibility and that errors made in word stress within sentences were responsible for causing misunderstanding in native speakers. However this should not be interpreted as that in pronunciation teaching, we should start with words. Since sentences are carriers of the rhythm of a language, the lowest teaching unit should be sentences rather than words. Then the question is 'which sentences?'

Many researchers found that formulaic sequences constitute a large proportion of spoken discourse (Schmitt & Carter, 2004). Altenberg (1998) found that 80% of the words in the London-Lund corpus of spoken English form part of formulaic sequences, remarking that "what is perhaps the most striking impression that emerges... is the pervasive and varied character of conventionalized language in spoken discourse... from entire utterances operating at discourse level to smaller units acting as single words and phrases" (p. 121). So which formulaic sequences?

Gatbonton and Segalowitz (2005) argue that since the formulaic nature of an utterance cannot be fully divorced from the contexts in which it occurs, many more such utterances can be found if searched for in specific pragmatic contexts (Coulmas, 1981) and communicative situations (Kecskes, 2002; Read & Nation, 2004).

Why should formulaic utterances be the focus of English pronunciation teaching and can the teaching of these utterances lead to grammatical competence? This question concerns the debate on whether learning a L2 consists of acquiring rules (rule-based learning) or simply mastering specific exemplars of language (Hopper, 1998; Kemmer

& Barlow, 1999). Some have suggested that language acquirers do not learn predetermined sets of rules (Hopper, 1998, p. 156) but learn particular instances of usage and construct commonalities from these instances as they go along (Goldberg, 1998; Healy & Schneider, 1998)(Goldberg, 1998, p. 209; Healy et al., 1998, p. 18; see also Kemmer & Barlow, 1999). Skehan (1996) suggests that both rules and specific utterances are learned either simultaneously or successively (exemplar-based learning occurring in the early stages followed by rule-based learning). Ellis (2002) identifies frequency-based exemplar learning as a major force in second language learning.

Levelt (1989), writing on speech production in native speakers, emphasizes that fluency in spoken language production in first language requires automaticity. What gets automatized are frequently used exemplars. It seems likely that fluency is greatly enhanced by the control of large numbers of frequently used exemplars. These prefabricated pieces are often strung together in a way appropriate to the communicative situation, allowing the speaker's energy or attention linked with single lexical units in the speech run to be freed up to plan larger stretches of speech. In many familiar communicative situations, concepts and speech acts can be expressed formulaically. So when communicating in such situations, if a speaker can pull these formulas readily from memory, that is, if these utterances are automatized, fluency is enhanced. Nattinger and De Carrico (1992) makes a strong case for teaching prefabricated units or patterns because they reduce the processing effort. Wood (2007) suggested that this automatic production of formulaic utterances reduces the amount of planning, processing and encoding needed within clauses thus giving 'the speaker time to pay attention to the multitude of other tasks necessary while speaking, such as generating specific lexical items, planning the next unit of discourse, syntactic processing of novel pieces and so on' (Wood, 2007).

If fluency is an observable indication of a speaker's control of formulaic utterances, what features of non-native speakers' speech are indications of fluency speak?

A significant amount of research (Cucchiari, Strik, & Boves, 2000; Freed, 1995; Lennon, 1990; Riggensbach, 1991) found that native judges may usually apply a blending of linguistic proficiency and effortless production in their judgment. In Freed's study, some native speakers' judgment were influenced by accent and intonation but for most judges, both rate of speech and number of pauses were major factors influencing their judgment of fluency (Freed, 1995). However, there seems to be a growing consensus in more recent research that fluency cannot be reduced to speed of delivery and that articulation rate has less impact on our perception of fluency than the length, the nature and the location of pauses in the utterance. Natural pauses, allowing breathing space, usually occur at some clause junctions or after groups of words forming a semantic unit. Pauses appearing at places other than these are judged as hesitations, revealing either lexical or morphological uncertainty. These hesitations may be either simply a silent gap or marked by non-lexical fillers such as "uh," "um," sound stretches (or drawls on words) or lexical fillers with no semantic information (such as "you know," "I mean"). Cucchiari et al's study confirmed that becoming fluent therefore is not just about speaking faster (articulation rate), but about pausing less often and pausing at the appropriate junctures in an utterance. What appears significant from research in this area is:

- the frequency of pauses rather than the length,
- the length of run (the number of syllables between pauses),
- the place of pauses in an utterance,
- the transfer (or not) of pausing pattern from L1 to L2.

Table 1. Characteristics of speech of the six native speakers from the ANDOSL database

Native Speakers	Average ROS	#p	tdp	mlp
Andosl speaker 1	4.17	0	0	0
Andosl speaker 2	4.30	1	0.37	0.37
Andosl speaker 3	4.70	1	0.22	0.22
Andosl speaker 4	6.20	1	0.39	0.39
Andosl speaker 5	5.94	4	0.90	0.23
Andosl speaker 6	5.67	0	0	0
average	5.16	1.17	0.31	0.27

Key:

ros = the number of syllables divided by the total duration of speech including sentence-internal pauses.

#p = number of sentence-internal pauses of no less than 0.2s.

tdp = the total duration of all sentence-internal pauses of no less than 0.2s.

mlp = the mean length of all sentence-internal pauses of no less than 0.2s.

Given that we need to focus on sentence stress, rhythm of English, increasing the length of run spoken by L2 students and the development of an ability to place pauses in the right places, a teaching method that involves the whole body in the process of learning is necessary.

THE PILOT STUDY

In the pilot study, 4 non-native speakers (NNS) of English's read speech were first analyzed against speech read by 6 young cultured female native speakers of English taken from the Australian National Database of Spoken Language (AN-

DOSL) database. Out of the four NNS, one is from Japan and three others are from Taiwan. After the initial analysis, the Japanese speaker underwent an intervention using the Somatically-Enhanced Approach (SEA) to correct her pronunciation. The intervention consisted of 10 hours of face-to-face contact. The Japanese student reported improved spoken English and improved listening ability in English.

The ANDOSL database contains phonetically-rich read material and spontaneously spoken culturally relevant material. 10 sentences read by both groups of speakers (see Table 1 and Table 2) were recorded and analyzed according to rate of speech (ros), number of pauses, total duration of

Table 2. Characteristics of speech of the three non-native speakers

L2 Speakers of English	Average ROS	#p	tdp	mlp	IELTS score
Japanese (Aiko)	2.87	7	3.04	0.43	6.5
Chinese 1	3.48	2	1.32	0.66	7
Chinese 2	3.21	6	3.22	0.54	7.5
Chinese 3	3.86	3	1.51	0.50	8
average	3.36	4.5	2.27	0.53	7.25

Key:

ros = the number of syllables divided by the total duration of speech including sentence-internal pauses.

#p = number of sentence-internal pauses of no less than 0.2s.

tdp = the total duration of all sentence-internal pauses of no less than 0.2s.

mlp = the mean length of all sentence-internal pauses of no less than 0.2s.

pauses and mean length of pauses (mlp). Rate of speech (ros) was defined as the number of syllables divided by the total duration of speech including sentence-internal pauses. Number of pauses (#p) is defined as number of sentence-internal pauses of no less than 0.2s. Total duration of pauses (tdp) is defined as the total duration of all sentence-internal pauses of no less than 0.2s. Mean length of pauses (mlp) is defined as the mean length of all sentence-internal pauses of no less than 0.2s. The ten sentences used were:

- S1: **The price range is smaller than any of us expected**
- S2: They asked if I wanted **to come along on the barge trip**
- S3: Amongst **her** friends she **was considered beautiful**
- S4: **The smell of the** freshly ground coffee never fails to entice me **into the shop**
- S5: I'm often **perplexed** by **rapid advances** in state **of the art technology**
- S6: John **could** lend him **the latest draft of his work**
- S7: **From** forty love **the score was** now deuce **and the crowd grew tense**
- S8: **The Presbyterian minister** managed to curb **the drinking habits of the loitering youths**
- S9: **The bulb** blew when he switched on **the light**
- S10: It **is** futile to offer any further **resistance**

Words that should be pronounced as schwa have been bolded.

In order to make sure that native speakers would pronounce the same words as 'schwa', these ten sentences were subjected to 'schwa' analysis by two native speakers. One native speaker underlined 52 words in the above ten sentences as schwa. The second native speaker underlined 34 'schwa' elements. These are used as a benchmark to measure whether our Japanese subject can pronounce words with 'schwa' or not.

According to Table 1, the six female native speakers (ns) of Australian English spoke on average 5.16 syllables per second; most of them (except one person) made at least one pause in the ten sentences. Speaker made 4 pauses of shorter than average length. The average length of a pause for the group was 0.27s.

Comparatively speaking, according to Table 2, the Japanese non-native speaker (nns) spoke only about 2.87 syllables per second and made as many as 7 pauses with a total duration of pauses of 3.04. The mean length of her pauses was 0.43 s. For the other NNS students, they spoken faster on average with 3.36 syllables per second and made a total of 18 pauses (on average 4.5 pauses per person) with a mean length of pauses as 0.53s.

For all NNS involved in the pilot project, the positions of the pauses are all internal to words rather than at the appropriate junction. The causes of these pausing errors were the unfamiliarity with words. The words these L2 learners had problems with were: S1: expected; S2: asked S3: amongst, S4: entice; S5: perplexed and advances; S7: deuce; S8: Presbyterian, loitering and in S10: futile

These findings concur with previous research on temporal variables of fluent speech which demonstrated that dysfluency in NNS' English speech is marked by slower rate of speech, frequency of pauses and the unusual location of the pauses.

Focusing on the Japanese speaker (Aiko, pseudonym), reading the same ten sentences, she spoken a lot slower and made almost as many pauses as the Chinese L2 speakers. Analysis of Aiko's reading of the ten sentences suggests that she did not know how to link words together (liaison), had problems with 'schwa' and had problems with the end of words such as 'asked' and 'wanted', 'along/arong) in sentence 2. She also seemed to be influenced by the orthography of the sentences because she was reading the sentences.

For instance, in sentence 1, she had difficulty with the string 'any of us' and in sentence 9, she did not link up 'switched' with 'on'. In order to highlight the importance of linking in English, I

Combining the Body and Mobile Technology to Teach English Pronunciation

chose the following poem to make her first perceive the importance of linking in English and then learn how to physically produce the linking in English. Though some researchers would argue that for pronunciation teaching to be effective teachers should use materials in class that are as close as possible to the speech learners would use outside the teaching situation (2001), in SEA the use of poems (as illustrated here) was only used to make students' aware of certain characteristics of English such as liaison, the stress-time nature of the language and so on. In using SEA to correct L2 learners' English, language that is similar to what the students would encounter outside the teaching situation would also be used.

The poem chosen was the popular nursery rhyme:

Cinderella dressed in yellow,

Went up town to meet her fellow,

She walked so slow, she met her beau,

He took her to a picture show,

How many kisses did he give her,

One, two, three, four.

(Taken from Celce-Murcia, Brinton, D. M. and Goodwin, J. M (1996, p. 300))

First of all, I recorded the poem for her to transcribe on a computer and asked her to do this as listening homework. When I saw her the following week, I found out that she could not transcribe the linked phrase 'went up town'. I did not immediately show her what the words were in the original poem. What I did instead was to follow the following steps to teach her the poem:

- is the relaxation step of SEA (Step 1) is not unlike the guided imagery activities

advocated in psychology such as neurolinguistic programming (NLP)-a set of pedagogical beliefs rooted in Counseling-Learning theory and Gestalt therapy (Richard Bandler & John Grinder, 1975; Richard Bandler & John Grinder, 1975; Grinder & Bandler, 1979).

- I hummed the first phrase 'Cinderella dressed in yellow' in 4/4 beat and asked Aiko to walk in a circle with me and repeat the hummed sentence in the same 4/4 beat with me. This was done 5 times. This was used to highlight the syllable structure of the sentence.
- I then clapped and hummed to the same phrase by clapping to the rhythm in 4/4 beat.
- I then continue to clap to the rhythm of the sentence in 4/4 beat but when I came to the linked words 'dressed in' I stamped my foot to emphasize the link between 'ed and in'. This again was done 5 times.
- In this step, I would say the phrase while instructing Aiko to only mouth the phrase but not to sound it out. Again this was done 5 times.
- In this step, I asked Aiko to still continue to walk in circles and then repeat the target sentence with me. This is the first time she was hearing the full sentence in its original rhythmic context.

By the time Aiko finishes step 3, she would already have uttered the sentence with the correct rhythm, intonation and stress, the use of gesture in step 4 then 'anchors' the previous learning for future recall so that such learning can be readily activated by students themselves at the point of need. Throughout the procedure, Aiko also had plenty of opportunities to reflect on the sentences she was learning. In teaching the third line 'She walked so slow, she met her beau', recalling that she made an error with the word 'asked' in sentence 2, I used the gesture of stretching a string

while walking to emphasise the length of the word ‘walked’ (walkt) in this particular line.

It was found that after two hours of such training, the L2 student’s awareness of English rhythm and stress patterns was heightened. She also reported that her listening skill in English also improved. I chose to use the procedure to ask Aiko to directly experience the different characteristics of the sentence through her perceptual system rather than through the medium of the written word. This was deliberately chosen to remove the influence of English orthography.

ROLES OF THE SPEECH ANALYSIS TOOL (SPTOOL) AND SMART PULSE PENS

The use of Praat (open-source acoustic analysis software) to provide feedback in pronunciation classes promotes autonomous learning in a field that has had to rely on native listener judgments (Wilson, 2008). Wilson (2008) further demonstrated the use of Praat to offer feedback on Japanese L2 students of English’s duration, pitch, and intensity of sounds although the paper did not contain data that illustrated the transfer effect of these activities on learning. Praat is the same software that is used to analyze data for this chapter. However, further validation of using Praat for language learning is needed.

Sptool and Data CD-Rom

The author, however, has been using Sptool (Zhang, 2003) which was developed and tested with numerous groups of foreign language learners (Buranapatana & Zhang, 2007; Zhang, 2005; Zhang & Wagner, 2005). It was designed to give learners the opportunity to listen and produce their own speech and then compare it to the native speaker model. Such comparison increases the probability of changing the ways they both hear and produce the target language. By con-

trast to other ASR-based CAPT system, Sptool (Zhang, 2003) is designed to offer feedback that is non-judgmental (i.e. without a scoring system) especially when the limitation of the current ASR systems prevent feedback on suprasegmentals to be measured accurately (Kim, 2006). Combined with the procedures in SEA, it allows students to explore and reflect during the process of learning, and not just at the end of the learning process. Recent research (Buranapatana, in press) suggests that L2 students of Thai used Sptool as a teacher providing modeling and feedback to students thus making them more confident in learning and speaking Thai.

In the pilot study described in this chapter, another use was found for Sptool. During the intervention phase of the pilot study, another native speaking ESL teacher was also recruited to teach. Originally the intention was to train him to teach Aiko using SEA but this was found to be difficult as the native speaking teacher was not familiar with the rhythm of his own language and kept on changing the pitch of the target sentence. For example, in teaching the following role play:

Sales person: Buy now, pay later

Interested buyer: Wait a minute, let me think.

While I introduced the sentence ‘Buy now, pay later’ according to the following pitch curve with the expressive aim of teaching stress on ‘now,’ seen in Figure 1 and Figure 2.

The native speaker kept on changing the phrase to the following curve where ‘now’ actually goes up rather than down.

Because in English, the same sentence can be expressed in different ways depending on what the speaker’s intention is, version 2 is of course also acceptable. But if the expressed aim of this sentence is to teach sentence stress with the accompanying gesture of stamping the foot on the ground, then it is essential that each time (as we walked around in circles) the sentence

Figure 1. Version one of the phrase “Buy now, pay later.”

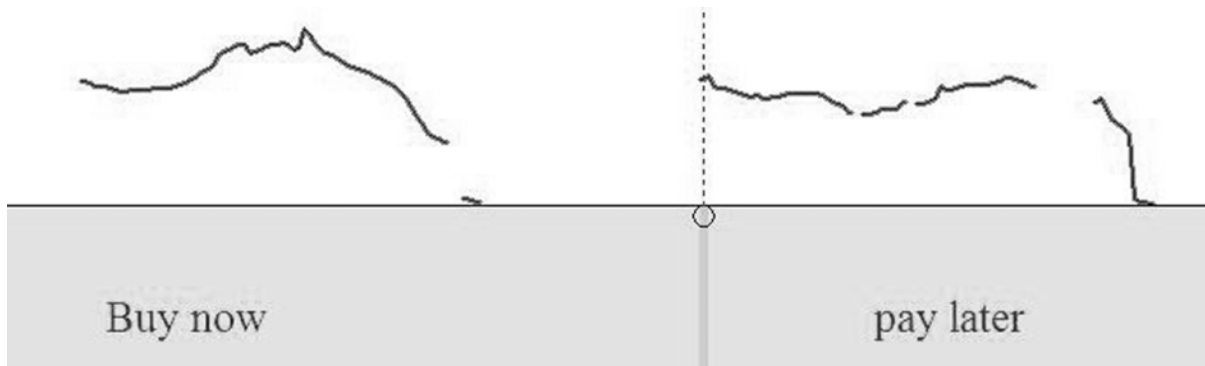
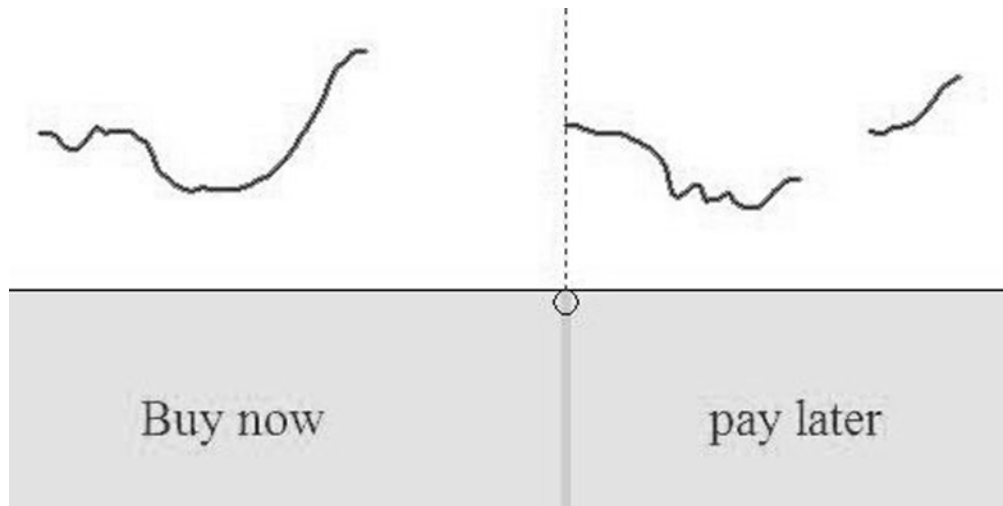


Figure 2. Version two of the same phrase “Buy now, pay later.”



is said the same way. Otherwise students will become confused.

In order to keep the sentence the same, I recorded the sentence on Sptool and used that to remind the native speaking teacher how the sentence should be said. This proved to be very useful guidance for the teacher. Since every sentence can be extracted with Sptool, students can also revise the same sentences covered in class in the comfort of their home.

The pilot project on using SEA to teach English pronunciation demonstrated the fact that native ESL/EFL speakers do not usually have a ‘feel’ for the rhythm of their own mother tongue. In fact,

a period of training is necessary for them to feel comfortable with the approach. Before they teach, they need to figure out what the rhythm, stress, intonation patterns of the sentences they want to teach are. Sptool can help them in this preparation and help them to keep to the same intonation pattern each time they teach the sentence during the session.

Fraser (2001) also pointed out that the aim of pronunciation lessons is ‘to give the learners information and guidance that they can act upon to change the way they speak’ and therefore it is important to set up the metalinguistic communication between the teacher and the students. The

use of visual cues through Sptool is part of such metalinguistic communication. In her research, Fraser (2001) used annotated spelling as visual cues. In SEA, visual cues are provided through gestures as well as through Sptool. The understanding and use of both types of visual cues have been built up in class between the teacher and the students. This way, L2 students would learn how to interpret the visual cues with the guidance of the teacher. Through the use of Sptool, L2 students also learn critical listening skills (Fraser, 2001) which enable them to monitor their own progress in English pronunciation.

Livescribe Smart Pulse Pen

Another useful tool for language learning is the Smart Pulse pen (<http://www.livescribe.com/en-au/smartpen/pulse/>). Two of the main components of the Livescribe platform are:

- Smartpen: a Montblanc-size computer with advanced processing power, audio/visual feedback, and substantial memory for handwriting capture, audio recording, and applications;
- Dot Paper with Dot Positioning System (DPS): technology that enables interactive, “live” documents using plain paper printed with micro-dots. (<http://www.livescribe.com/en-au/smartpen/pulse/>).

In my lectures, I use Livescribe’s first key application is “Paper Replay” to take notes during a discussion or lecture. The Smartpen also records the conversation and digitizes the handwriting, automatically synching the ink and audio. By later tapping the ink, the Smartpen replays the conversation from the exact moment the note was written. I also upload the notes and audio to my PC and later uploaded to the Livescribe website for my students to access. All notes and audio can be replayed, saved, searched and sent through Livescribe desktop.

This year in my Chinese class, I also used the Smartpen in combination the dot paper to assist a student with disability to keep up with the Chinese unit he was doing. I printed the entire teaching material onto the dot paper that works with the Smartpen and recorded each sentence on the page in Chinese. This way when the student taps on the sentence, he/she can hear the audio file for the sentence. This student was helped greatly by the Smartpen and the textbook even though he was absent from tutorials due to circumstances beyond his control. An interview with the student suggested:

I guess I just learn all the characters, quite difficult. Using the pen and I can listen to the characters as well. I can relate to them. The pen has all the sections recorded on it so I turn the pen on and listen to it, I relate sounds to character. There is no need to be in front of the computer. I do an hour each day. I prefer the pen to the cd, because it is more accessible and portable.

Smartpens are currently still too expensive for extensive experimentation but anecdotal reports suggest that packaging textbooks on dot paper and the Smartpen makes learning mobile and has the potential to increase time on task.

CONCLUSION

This chapter outlines the SEA approach, which aims directly at promoting the teaching of English pronunciation by re-emphasizing the central role of the body in initiating and sustaining the automatization of the language learned in a manner compatible with a communicative approach to language teaching. It was argued that for this approach to succeed in the goal of automatizing the language learned the target language items (sentences rather than words) need to be experienced and practiced through the L2 learners’ perceptual systems. Fraser pointed out (Fraser, 2001) that:

The subconscious concepts that actually drive our understanding and behavior can only be learned or altered through experience and practice. A teacher can only ever be a facilitator in this process—the learning must be done by the learners themselves. Explicit teaching can only affect conscious concepts. This is often described in terms of a difference between knowing that and knowing how. For the conscious concepts of knowing that to actually affect our behavior or knowing how, they need to filter down to the subconscious level.

The steps in SEA are illustrations of how ‘conscious concepts of knowing that’ (initially within the domain of the teacher’s knowledge) can filter down to the L2 students’ subconscious level through the use of movement and gesture consistently and repetitively throughout the classroom procedure. L2 students therefore, learn through guided experience which helps them build up appropriate subconscious concepts (Fraser, 2001). The build in repetition is also important because ‘from a psychological perspective, because of the high consistency of situation-utterance correspondences across the repeated events, this repetition will lead to automaticity in both reception and production (Schneider & Chein, 2003).

The most important criteria for this approach to succeed is for it to be driven by evidence of errors collected from L2 learners’ speech so that corrective measures applied are more targeted. In certain respects, many of the features contained in SEA are traditional, and teachers will easily recognize many of the illustrative activities as similar to ones they have developed or used. Many of the activities are similar to progressions in task-based activities as advocated by Willis (1996). Two things about SEA, however, are new. One is its focus on automaticity and the goal of promoting it primarily through perceptual and productive activities embodied in the classroom procedure. The other is the use of computer-enhanced technology and mobile technology such as Sptool and

the Smart Pulse pen to enhance the provision of feedback to students.

It is argued that that SEA can be applied to the teaching of English pronunciation in order to help L2 learners of English to develop ‘functional intelligibility, communicability, increased self-confidence, the development of speech monitoring abilities and speech modification strategies for use beyond the classroom’ as advocated by Fraser (2001).

The methodological perspective presented here is not intended to supplant current CLT methodologies. In fact, it can be part of any CLT classrooms. Making the automatization of utterances a central goal means it is possible for a CLT methodology such as SEA to be designed to allow students to go home with things they can act upon (e.g., practice, compare and reflect on, and use essential language learned) with the help of the mobile learning tools. Experience with teaching Chinese as a foreign language in Australia suggests L2 students are no longer learning the way we used to do. They now learn through looking up dictionaries online, on their iPod touch, iPads or iPhones.

A book printed on Livescribe dot paper with the Smart pulse pen might look like a return to the book but its mobility and easy access to sound files mean that students can now learn through their ears without the interference of the written script in any language. Therefore, if the methodological principle is to train them to perceive certain sounds or differences between a particular sound in their mother tongue and in the target language (i.e. differentiating ‘r’ from ‘l’ in English for Japanese learners of English), then with the help of the Livescribe dot paper and the Smart pulse pen, we can conduct research into what kind of materials might be suitable for this kind of training. Such arrangement of teaching and learning materials has enormous potential for the future of foreign language learning.

Finally, SEA brings together insights and knowledge gathered from personal experience as

well as from a rich body of research described in the literature review. The attempt is to make the approach testable by making the design criteria explicit and by founding it on basic principles concerning learning, memory, attention, and skill acquisition drawn from cognitive science. It is hoped future research with SEA will yield improved practical solutions for the teaching of English pronunciation.

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Chapter 11

Text Input and Editing as a Bottleneck in Mobile Devices for Language Learning

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ABSTRACT

The introduction of mobile telephone technology has been accompanied by a surge of activity in MAL (Mobile Assisted Learning) and MALL (Mobile Assisted Language Learning). The convenience, access, ubiquity, and flexibility of mobile devices is starting to have an impact not only on the provision of technology-enhanced language learning, but also on the materials which it generates, including JIT (Just In Time) learning, undertaken for short periods as opportunities present themselves during the course of the day.

The situation has recently been compounded by the release of a number of tablets, which are situated between mobile phones and laptops.

The multimedia experience of MALL, especially its capability to handle authentic audio and video, have made it an attractive and potentially powerful component of the language learning experience. However, the benefits of MALL are—as with other mobile technologies like the tablet—emphatically on the access and consumption side. Mobile phones have some, but restricted, usefulness for practising speaking. But most of all, they have complex and somewhat compromised capacities for writing (for text input and editing).

This chapter examines the technical, ergonomic, and cognitive implications for MALL for text input and editing with special reference to the mobile phone, but also in relation to tablets where they are relevant to the argument. It examines a number of options and their implications, and it presents a set of specifications which, if met, will allow mobile devices and MALL to play a fuller role in the writing aspect of language learning.

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INTRODUCTION: MALL, MOBILES, AND THE LEARNING EXPERIENCE

The convergence of the mobile phone and the laptop and desktop computers—or rather, the partial usurping of the laptop/desktop functionality by mobile phones—has created a potentially powerful tool and medium for learning in general (Ally, 2009; Danaher et al., 2009; Godwin-Jones, 2008; Herrington, 2009; Pachler et al., 2010), and language learning in particular (Cui and Bull, 2005; Kukulska-Hume and Shield, 2008). The mobile phone contributes connectivity, mobility and convenience, together with interactivity. From the laptop, and the larger computers behind it, we have full multimedia, storage and networking, allowing access to the wider domains of scholarship and research. Making mobile devices able to access the Internet has filled one of the remaining gaps between the two families of IT devices. Mobiles are expected to usurp many of the functions of laptops and desktop computers within a few years, especially since tablets, which sit unstably in the space between mobile phones and laptops, are starting to make an impression on both these areas of computer use (Chen, Chang & Wang, 2008).

If the computer allowed the learner to choose about emancipation from the time and space of the classroom, and if wireless networks emancipated users from the need for a physical connexion to the Internet, then mobiles have taken the process a step further in convenience and portability. GSM networks enable unscheduled learning, in small time slices and as opportunities become available. This m- or mobile learning environment is still largely without theory and models, which are being developed bottom-up by practitioners, and to some extent top-down, as e-learning materials and practices are re-purposed for m- use. Supporting learning in this less structured space remains problematic, especially since so much of the onus is now placed on the learner to make sense of the material, discover a means of learning

it, and assessing when it has been learnt. Access, interactivity and multimedia on m-devices present splendid opportunities, at least in potential, for new modes of learning.

The downsides of mobile devices, however, are also significant. They include storage, processor speed and capacity, screen size and dynamics, and perhaps most significantly the issue of input and editing, whether of text, graphics, audio or video. In a multimedia interactive enterprise like Mobile-Assisted Language Learning (henceforth: “MALL”) these issues could potentially prove very limiting, and could restrict MALL to a corralled corner of the IT-enhanced language learning spectrum (Cabrero, 2002; Kiernan, 2004; Kukulska-Hulme, 2009; Petersen et al. 2008; Stockwell 2007; 2008).

Mobiles are already strong on the delivery of text, graphics, audio and video, and for the interactive transmission of these media, so long as the processor is not expected to undertake intelligent processing. They are also effective for the input, recording and transmission of audio and video. These features make mobiles suitable for three of the four language functions (listening, speaking, reading).

Writing is the problem, and this is the focus of the present paper. Mobile devices are not strong when it comes to text entry and editing.

There are effectively three options. One is to keep the mobile device as a minor vehicle for text input and editing, and to continue to use laptop or desktop computers for this purpose, with the mobile phone being reserved for short messages like SMS and tweets, and for interactivity using wireless networks. A second option is to add a portable keyboard so as to combine the functionality of a mobile phone with that of a laptop or desktop. A third is to explore ways around the limitations of current keyboard functionality on the mobile phone.

This chapter presents an analysis of the problems and issues of text input and editing on mobile devices. A number of proposed options try to work

with the keyboard in various ways. Others explore manual but non-keyboard operation and still others aim to avoid the keyboard concept altogether. Solving this problem will have a major influence on the future development and success of MALL, since it affects not only the mechanics of text input and editing, but also the cognitive shape of the kinds of learning which MALL can support.

TEXT INPUT AND EDITING AS A PROBLEM FOR MOBILE DEVICES AND FOR MALL

In general terms, keyboards and keypads function only moderately well for the purposes of MALL. The disadvantages have mainly to do with their more general shortcomings as input and editing devices, rather than with their language issues, or with the application to CALL or MALL (Butts and Cockburn, 2002; James and Reischel, 2001; MacKenzie and Soukoreff, 2001; MacKenzie et al., 2001; Silfverberg et al., 2000).

With the exception of very short genres like SMS and tweets, writing is a secondary activity on a mobile device, and especially mobile phones. Short genres can certainly play a significant role in MALL, including second-language MALL. And the whole concept of JIT (Just In Time) learning in short time slices, especially when interactive in real time or with feedback in relatively short time, is attractive (Nah, 2009; Nah, White and Sussex, 2008). This language can be highly creative, and show dynamic adaptations of both language and medium to new technologies (Crystal, 2008). But the generally unsupervised and low-edited nature of SMS and tweets means that they are less than optimal for developing stable language skills in their raw form without instructor supervision. And the ergonomics of text input impose significant limitations on their actual and potential usefulness.

Keyboards: Sequential Input

Typewriter keyboards started to appear in the middle of the 19th century. The QWERTY design was patented in the USA in 1878 by Christopher Sholes with the explicit goal of slowing typists down, since earlier designs of the keyboard resulted in the type bars becoming jammed in the gate before striking the paper on the platen. The DVORAK keyboard is similar in size, but has a different arrangement of letters and numbers, designed to enhance speed and to avoid issues like the 3,000 words which are typed with the left hand only on the QWERTY keyboard (Russo, 2010).

A typical QWERTY keyboard on a laptop computer has 88 keys, including keys for the entry of alphabetical, numerical and punctuation marks, modifying keys, function keys and cursor-movement. The keys work primarily in sequential mode (a key press results in an event on the screen). There are also “dead keys” which allow the composition of letters from individual characters, for instance by displaying an accent with one key stroke and then using another key stroke to display the letter that bears it. The modifying keys are concurrent, in that more than one key needs to be pressed simultaneously: Escape, Shift (duplicate left and right), Function key, Control key, Option or ALT key, and Command key. The CAPS LOCK key is a sequential variant of the SHIFT key, and modifies all following key presses to upper case, but only with alphabetical keys. The concurrent keys activate commands (the Function, Control and Command keys). The Option key activates alternative character layouts, and can be used in conjunction with the Shift key. Characters not available by this method can be accessed either by entering ASCII or Unicode codes via the keyboard, or by selecting different country keyboards (Arabic, Russian, Chinese, etc.: http://en.wikipedia.org/wiki/Keyboard_layout).

The space occupied by the keyboard, excluding the track pad and the mouse pad, is typically of the order of 27cm x 10cm. The smallest key size

that can conveniently be used by human fingers has been established at 19mm (http://en.wikipedia.org/wiki/Keyboard_layout). This places limitations on keyboards in smaller computers. It also raises immediate problems of text input where the size of the device is much smaller than this. While there are Personal Digital Assistant devices with QWERTY keyboards, they typically have to be operated with a stylus or the tip of a finger, or the corner of the tip of a finger, which radically reduces the speed and convenience of use.

Many of the sequential keys are, if not actually redundant, then at least under-utilized. Depending on the type of work, characters like “#”, “¶” and “§” may receive little use; and writers of English may not need to access the accents common in many European languages.

Full keyboards can allow impressive speeds of input. According to the Guinness world records (online), the world record, on a DVORAK keyboard (which is known to be inherently faster than a QWERTY keyboard), is held by an American legal typist, Ms Barbara Blackburn, at 212 words per minute at burst speed. She was able to sustain 150 words per minute for 50 minutes. A highly competent performance level for regular QWERTY touch typists is 60 words per minute, using a modern computer keyboard without the need of the physical movement to perform a carriage return (these performance data are accessible in the online Guinness world records).

Chording and Chorded Input Devices: Concurrent Keystrokes

Chording, as in playing chords on a keyboard musical instrument, involves the concurrent pressing of two or more keys. As we have seen, this strategy can be used with alphanumeric keyboards to modify characters or to allow access to other characters. The most famous demonstration was by Douglas Engelbart and his 5-button input device in 1968 (Reimer, 2005; and see Wigdor and Balakrishnan, 2003; 2004).

Chording has been in use since 1830, when the first stenographer’s machine was patented in the USA. Stenographers’ machines, now commonly called stenotypes, typically contain 21 keys. Letters are recorded by pressing one or more keys simultaneously. Speech can be captured at impressive speeds: it is not uncommon to find speeds of 300 words per minute, and the world record for American English 375 words per minute (<http://en.wikipedia.org/wiki/Stenotype>). Few speakers could match that sustained output. The output is a special form of conventional phonetics. While unambiguous to a skilled user, it must then be re-typed into standard English. The stenographer’s application of chording, then, is appropriate for the capture of speech in real time. It will not be directly usable for everyday text.

The chording principle, however, has been applied to the design of innovative keyboards with only 8 keys or less (<http://chordkeyboard.com/index.html#chord-keyboard>). Using combinations of key presses, such keyboards can issue the ASCII and extended ASCII character sets up to ASCII 255, which includes most characters in most European languages. It is claimed that startup speeds for novices are twice as fast as for QWERTY or DVORAK keyboards, that skills decay more slowly if the user does not type (or “chord”), and that there is a lower incidence of Carpal Tunnel Syndrome and Repetitive Strain Injury, especially since the fingers have no lateral movement: a finger touches a key, and either presses it or does not. Chorded keyboard input is reported to be comparable in performance to touch typists working with QWERTY keyboards, and with lower error rates. A representative commercial product is the Twiddler (Lyons et al., 2004).

It is possible to extend this line of thinking into aspects of gestural computing, where human body and facial gestures are interpreted by the computer and acted on accordingly. Gesture-based computing has been identified by the New Horizon Consortium as one of the technologies likely to make an impact on teaching and learning within

Table 1. Typical mobile phone keypad layout

1	2 ABC	3 DEF
4 GHI	5 JKL	6 MNO
7 PQRS	8 TUV	9 WXYZ
*	0	#

4-5 years (Johnson et al., 2010). There are already glove-shaped text-entry devices under testing, which involve combinations of finger gestures detected by a micro-processor in 3-dimensional space (Rosenberg and Slater, 1999).

We can expect a plethora of non-keyboard digital entry devices for text to appear over the next few years. Whether any will achieve the ubiquity of the QWERTY keyboard remains to be demonstrated. We will have to address issues of standardization, as well as public health: public computer keyboards are notorious factories of bacteria and viruses, so that using a publically available glove for text entry would be problematic without sterilization of the glove between uses (Kassem et al., 2007). The attraction of these devices, however, is that they are small, light and flexible. It is not difficult to imagine carrying your personal one as you do a wallet, and using Bluetooth—or, if necessary, a USB cable—to connect it to display devices to text entry and editing, either a device like a tablet that we carry with us, or public screens connected to a network connected to The Cloud. The advantage here is that both Bluetooth and the Cloud are evolving stable standards for international use.

All this, however, remains for the time being in the experimental and developmental stage. Until such time as such devices are shown to be ergonomically, functionally and cognitively superior, they will remain as potential contributors to text entry and editing on mobile devices, and so to teaching and learning using MALL.

Keypads and Keyboards

Earlier mobile phones used the keypad taken over from push-button telephones, the successor to the rotary dialling mechanism. The letters are arranged in a various ways; Table 1 is a typical layout:

This layout allows for mnemonics like “13-CABS” to ring a taxi company, which have been widely exploited for commercial purposes.

Early multi-press versions required for instance two presses on the 3 key to achieve “E”. But the 10-button keyboard is nowadays normally supplemented with T9 technology, a patented predictive text mechanism which allows single presses whereby, for instance, 8-4-3 will result in the display of “the”. Statistical algorithms drive the selection, and more recent models can be sensitive to the user’s ongoing preferences for specific words related to keypresses (Dunlop and Crossan, 2000).

T9 users either use a single finger or two thumbs, this latter mode being the fastest consistent with holding the device in visual range. The current record speed for T9 is around 125 characters a minute, or roughly 30 words, though in a competition against an expert using a Morse-code key, T9 came off a very poor second: the world record in Morse is 75 words per minute.

T9 can operate with non-English alphabets, and adaptations of the T9 concept are available for character-based languages like Chinese. Using extended character sets for accented letters, however, can be slow and ergonomically inefficient. As a complement to the keypad as a text entry

device it is useful. But taken together the combination is disappointing in speed and convenience, except for short messages like SMS and tweets. As a learning device it is significantly limited. The principle, however, does have applications to language disorders like dyslexia (http://www.wordlogic.com/assistive_technology.html).

There is insufficient space on a mobile phone for a QWERTY keypad. But the current generation of mobile phones has on-screen QWERTY keyboards, usually with alternative keyboards activated through control keys to display numerals, punctuation and special characters. Accented letters are displayed by pressing a “key” and selecting from the accented letters displayed. There are different country keyboards, as with regular computer keyboards.

On-screen QWERTY keyboards are supplemented by predictive text mechanisms similar to those of T9 in result. They are useful to catch and correct the very frequent key errors, which are partly the result of the relation between finger size and the size of the sensitive spaces on the screen corresponding to each letter. In portrait mode these are typically 4mm wide, which is much smaller than the 19mm used as a benchmark for regular keyboards (<http://chordkeyboard.com/>). Rotating the mobile device 90 degrees into landscape mode—a feature allowed only by some devices, and by only some applications—increases the width to 6mm, which is better but still sub-optimal. Experts can use this system with two thumbs, as with keypads. But unlike keypads, touch-typing is barely possible, and one is forced to focus on the keyboard and then to check the result on the screen, resulting in major penalties of speed. The central problem here is feedback. Pressing a key on a regular keyboard provides tactile feedback and so allows touch typing. On-screen keyboards can provide audible feedback; there is also software to provide a tactile buzz to indicate a successful key-press, which could in theory promote limited touch typing. In either case one has the strong

impression of partial solutions dictated by the limitations of a particular technology.

An older option was handwriting. The Apple Newton was well ahead of its time when it was released in 1993. Handwriting recognition has improved a great deal, but recognition speeds and error rates are unstable. A more recent development is “swype” input. This proprietary technology has been implemented for on-screen keyboards, and consists not of discrete key presses, but of a motion of the finger across the letters, pausing or turning to select a letter. So to type “was” one touches W and moves the finger successively across A and S in a smooth motion. Swype typically involves single index-finger use as opposed to the regulation two-thumbs technique of T9 users. This is a promising analogue development. Speeds of 50 words per minute are claimed, and preliminary tests show it to be significantly faster than sequential key presses. However, this technology is still to be thoroughly tested in terms of error rates, productivity and cognitive naturalness of use. It is becoming available for a widening range of smart phones (<http://www.swypeinc.com/>).

The area of text selection, manipulating and editing is also one where the mobile device has yet to provide satisfying solutions. Cursor movement is by holding a finger to the point on the screen where a change is required. But the finger is literally a blunt instrument, and selection is difficult unless one has slim fingers. One then moves the finger to the point where the cursor is to be positioned, and can then select, select all, cut and/or paste. This whole process, which has formed a rough industry standard, is ergonomically clumsy, error-prone, slow and frustrating. On the other hand, predictive text acts as a kind of spelling check. Grammar checkers are under development for mobile phones. Dictionaries are plentiful, especially in English, and other-language and bilingual dictionaries are increasingly available and workable.

For the serious writer, however, keypads or on-screen keyboards are frustrating devices, relatively

slow in operation and with an irritatingly limited display of the input text, so that it is necessary to scroll, or pinch or expand the text, to see other parts of the text. But substantial consecutive is possible on such devices, witness the enormous popularity in Japan of keitai shoshetsu, or cell-phone novels, written on mobile phones mainly by women. In 2007 four of the top five selling novels in Japan were written in this mode (Hjorth, 2009).

VOICE-ACTIVATED TEXT INPUT: DICTATION

The growing efficiency of voice activation in issuing commands to portable devices, and the increasing accuracy and usefulness of dictation software, indicate that voice input has potential as a text-entering and editing medium for mobile devices.

There are, however, significant limitations on the current performance of both types of voice activation.

First, voice recognition and transcription (converting speech into on-screen written text) on mobile devices is currently not sufficiently robust for full text input. Google's voice-activated search is one of the better implementations. And second, even the best current voice-recognition and dictation software is subject to intermittent failures, mis-recognitions and stalls. Dealing with non-standard text is problematic, since the spelling mode is slow and tedious, though reasonably robust. And editing with voice commands, though a diverting alternative, is inconvenient and enormously slower than keyboard and mouse actions, especially for experts in word-processing and text manipulation. These problems are compounded when we consider limitations on the size of the screen (see below).

Equally fundamental, however, are the acoustic issues of the audio input device and its operation. Transcription software works best in an environment with low ambient noise and no competing

voice input. This is precisely what we typically do not find in places where mobile devices are in use. A microphone with a frequency response of 30Hz - 18KHz would normally be sufficient for accurate capture of human speech. This is the sort of quality which is highly relevant to language study. But the software driving it struggles in the presence of loud ambient noise, especially vocal noise.

There are several acoustic-mechanical options. One involves directional microphones, perhaps assisted by noise-reduction or noise-cancelling technology. Another involves throat microphones, of the type used by combat aircrew wearing masks. These devices are yet to be rigorously tested for the kinds of high quality speech recognition that we are dealing with here. It is doubtful, on the current evidence, whether a throat microphone would provide sufficiently accurate information for accurate transcription from the upper part of the vocal tract.

A more cognitively-based potential limitation relates to planning, text structure, writing and editing. There is a well-established body of research on composition and the writing process, and the ways in which writing can be taught to incorporate thematic structure (Scardamalia and Bereiter, 1986; Berninger, 1999). But there is only limited research on dictation and text structuring (Boscolo (1990), including the question of dictation as an aid for people with learning disabilities (de la Paz, 1999). But if audio dictation becomes a major channel for text input and construction, it will be necessary to explore how well audio-writers can compose almost in real time. This kind of skill is found in experienced public speakers, lecturers, comedians and some politicians. It is likely that acquiring this skill set will become a significant part of competence in audio-based text input, and that it will require a complex interplay between audio composition and the kinds of outlining and composition tools commonly available on word-processing and writing-training software.

SCREENS, TEXT, AND FEEDBACK

Mobile devices are problematic when it comes to the consumption and manipulation of text. Three issues are paramount: ambient light, screen size, and the ergonomics of text manipulation (Chae and Kim, 2004).

Ambient light, particularly direct sun light, makes it difficult to view the screens of mobile devices. This problem, which mobiles share to some extent with the LCD viewing screens of digital cameras without an eye-level viewfinder, is on current indications intractable, and offers one of the signal advantages of paper printing. The best one can do is to hold the device at right-angles to the sun, and try to create local shade to enhance viewing (or to seek shade).

Screen size is one of the most debated issues in the mobile phone <> tablet <> laptop controversies. The smallest screen size compatible with text of legible size, and of sufficient quantity per screen, appears to be the iPhone and its current competitors. This size can work for the consumption of text, although the repetitive gestures for page-turning are tedious, and the pages are split into chunks which do not facilitate speed or skim reading. More serious, though, is when a larger spread of text is displayed on the screen, and one has either to move the text around, or to shrink or enlarge it using the now familiar two-finger “pinch-zoom” gesture, or both. Unless – for instance – newspaper publishers have produced mobile-friendly versions of their stories, reading such texts can be slow, frustrating and fragmented.

Worse still is the problem of text editing. The screen-based text editors for mobile phones are highly restricted and restrictive. They allow text entry, deleting, and, with some difficulty, cut, copy and paste. Selecting text involves finger gestures on the screen where the size of one’s fingers can obscure the text being edited. Eliminating the size constraint on a larger screen, like that of a tablet, is a clear improvement. But the tablet is not highly portable, in the sense that a mobile phone is.

There have been prototypes of fold-out screens, rolled screens, and screen and keyboard projection devices (the latter only usable in low-light environment: see <http://www.virtual-laser-keyboard.com/>). These all provide a large reading and working space. But unless they are also touch-sensitive, or unless they are accompanied by devices to control the cursor and text manipulation on the screen, they are effectively almost as limited and limiting as the un-augmented small screens.

All these considerations relate to the key issue of the relationship of text display and the input device. If we consider text-only display, as when reading an e-book, a mobile phone like the iPhone can display about 18 lines of text in a middle-sized font, with about 6 words per line, making about 100 words of visible text. Reducing the font size can increase the amount of text, but at the expense of legibility. 100 words is enough for a short paragraph, so that the text can be read and apprehended as a single unit without scrolling or re-sizing by pinching or expanding with finger gestures on the screen.

The previous paragraph contains 106 words, and so will just overflow a mobile phone screen at an average, legible font size. Being able to view the current text chunk in its entirety is important for composition and editing. For anything but 160-character SMS messages or 120-character tweets, a limit of 100 words is workable, though inconvenient with longer or more complex text. An iPhone can at a pinch display 30 lines of text with 10 words a line. But legibility is compromised. And this is without the presence of the keyboard or keypad. Once that is displayed on the screen the input is often reduced to a one or a few lines. A typical word-processing application on a mobile phone allows only 7-10 lines with a maximum of about 10 words per line, which is too short for substantial textual work.

For the appropriate display of text for writing other than very short messages, therefore, it will be important to take the keyboard off the screen. A physical keyboard, communicating with

the mobile device by Bluetooth, is feasible but inconvenient. Transcription is possible, though the software for mobile phones has some way to go before it will be usable. But it is important to be able to see the text one is creating: holding the phone to one's ear, talking into the phone's microphone, and then taking it away to see the result is impractical and inconsistent with productive writing. Dictating using the hands-free option allows one to see the text as it being created. But this mode is susceptible to interference, and in any case the use of the phone's microphone is limited by the relatively low audio quality of the microphone. A small special-purpose quality microphone, either held in front of the mouth or mounted on the boom of a head- or ear-worn device, looks like the only option. Alternatively, a light, compact hand-held device like a glove or the Twiddler (Lyons et al., 2004) could provide accurate and sufficiently fast input to the mobile device, or for that matter to other screen-based devices with Bluetooth (or USB) interfaces that one might encounter as one goes about one's daily business.

These observations apply also to tablets, with less emphasis on size limitations and text display, some emphasis on on-screen keyboards and their workable size, and approximately equal emphasis on the effective entry of text.

IMPLICATIONS FOR MALL, TEXT, AND MOBILES

As Warschauer and Healey (19998), Bax (2003) and others have argued, effective learning using technology is facilitated if the technology is transparent, or, in terms of the learning context, practically invisible. In the case of general computer hardware and software, it is now possible to argue—though not without some important qualifications (Hoven and Sussex, in preparation)—that the technology is indeed transparent, though not invisible. Under such conditions learners are able

to focus on the content of their learning, rather than having to struggle with the medium which stands between them and the learning experience and materials.

But as we have seen in detail, the current standing of text and text editing in relation to MALL and its technology is anything but transparent. A range of problems and partial solutions accompany, and indeed hang uncomfortably over, the experience of the language learner trying to come to terms with the limitations and the potentials of this medium.

From one point of view this may not be critical. Mobile devices, including the tablet and its growing competition, have positioned themselves pre-eminently as access devices for the consumption of material, whether text, graphics, audio or video (Chen, Chang and Wang, 2008). Their connectivity is by wifi to the Internet and The Cloud. From this point of view it possible to argue that text input and manipulation can well be done elsewhere, on devices inherently better suited to that purpose. Or on the tablet itself. It is significant, though, that while devices like the Apple iPad have on-screen keyboards, many users also buy a lightweight Bluetooth QWERTY keyboard. Whether they will persist with carrying two devices, rather than a single laptop, remains to be seen.

For the time being, multimedia exposure to authentic language learning material will provide a very appropriate MALL role for mobile devices. And given the audio recording possibilities of mobile telephones, it is also possible to exercise one of the two active skills (the other being writing), and to send the results to a tutor by GSM or the Internet, and receive feedback, not quite in real time, and not quite interactively, but not far short of it – and with obvious and recognized potential for the enhancement of language skills.

And yet this answer is less than satisfactory. One of the things that we have learnt about computers and language learning is that the technology tends to throw up affordances (Gibson, 1986)

which were not originally part of the design intention. Affordances are the opportunities which an object offers for action. I very much doubt whether the inventors of Microsoft Word Tracking had thought of it as a tool for teaching academic writing in a second language; but I have used it this way with satisfying outcomes. The bottleneck which is text input and editing on mobile devices presents a set of affordances in waiting, not only for mobile devices per se, but especially for MALL teachers and learners.

Language Learning, Communication, Collaboration and Sharing

One of the most emblematic street poses of our era is the individual, head slightly bent and turned to one side, elbow raised holding the phone to the ear, walking, talking, and only partly connected to the surrounding people and the context (Johansen and Hansen, 2006). This activity is interactive, but in the relationship between the user and the mobile instrument it is private and solitary. The interaction takes place with another private, solitary person doing the same thing in another location. The second emblematic pose is the individual holding a mobile phone in front of them, both thumbs active in texting, writing SMSs or tweets on a mobile. This activity is only slightly less private, though some, especially students out of school, may share screen content with each other. But essentially it is still a person-to-person transmission via the mobile service provider (Strom, 2002). The interactivity and collaboration take place with another individual, or individuals at the other end of the communication chain. Symptomatically, both these are standing poses, which underlines relatively transient nature of communication in mobile modes. Sustained text input, on the other hand, is almost always done in the sitting position.

Mobile devices can, to some extent, be used collaboratively in real time, and so they have applications for interactive MALL. Phones can be

used in speaker mode, so that multiple users can interact with one or more people at the other end of the line. Sharing text, however, is related to the size of the screen. One can show a small screen to a bystander, but it is difficult for more than one person to use such a screen concurrently, unless you are able to share the screen electronically via a device like Bluetooth. Tablets are better in this respect, and laptops better still (ambient light levels allowing). Sharing input devices for text, however, is even harder. This restriction also holds for full-size QWERTY keyboards. Collaborative text production in real time usually requires multiple keyboards, and so multiple separate processors.

SPECIFICATION

We can now provide a target specification for a text input and editing device for use on mobile devices. Such an input device should:

- a. be portable in size and weight;
- b. be integrated with or complementary to the phone: either a physical part of the phone, or a separate device;
- c. provide feedback, not only by the display of characters and formatting on the screen, but also ideally in tactile form as well, perhaps by vibration detectable through the fingers for every successfully entered character (and perhaps with a different vibration for a lack of success, analogous to the key-bar jam on a manual typewriter which one has tried to use too fast);
- d. be ergonomically sound, both in terms of speed with comfort, but also speed with medical security: this means low levels of risk for RSI and other symptoms involving repetitive actions at speed;
- e. be flexible, usable by people with hands and fingers of different sizes;
- f. be easily learnable. A QWERTY keyboard, or a piano keyboard, are evident and learn-

able, since you know where all the keys are. The startup curve is relatively smooth. Mastery requires time and effort, but it is not like learning the violin, where you have to know exactly where to put your fingers in order to produce a sound of a specific pitch. This includes multiple languages, orthographies and styles of writing, including character-based (Chinese) and other non-alphabetic scripts;

- g. be maximally simple, a corollary of “f.” This is a very complex, and potentially compromising, criterion;
- h. preserve privacy. This is where voice recognition is problematic if there is anyone else within earshot who may overhear. This is one area where non-auditory input is much preferable;
- i. work in “noisy” environments, where “noise” is both auditory noise, and other confusing inputs;
- j. allow speeds which will match the needs and capacity of the user. Not many can both type and compose at 100 words/minute sustained rate, but there are some, and they should not be hindered by technology which simply is physically unable to work at the required speed. While the QWERTY keyboard is certainly less than ideal, it also clearly allows appropriate speeds up to and well over 100 words/minute. Not many of us, including experienced writers and journalists, can work at that speed, even in short bursts;
- k. allow input in at least major languages, exploiting the hardware and software to meet the requirements in the above list.
- l. be as acceptable in standard use as possible. It is highly likely that the QWERTY keyboard will continue in use, in various forms (external keyboard, integrated keyboard, touch-screen). Its success—in the terms of Norman’s (1988) psychology of everyday things—has been that it has been so stable a standard. With the exception of relatively

minor variations to accommodate different language-specific keyboard layouts, QWERTY is a format which is global and recognizable.

The screen is an indispensable part of this installation. There is a major tug of war between size and portability, and between size and legibility, as well as the screen’s ability to display enough text to meet the current needs of the writer. We have discussed above the issue of displaying screens which show only part of a complete page. The issue of visualization and navigation to display different portions of the current page, and in different views, needs much more investigation.

Three Speculative Directions Ahead

In addition to the changes and developments in text-entry and editing technology which we have discussed, there are two areas of particular interest to the future of mobile devices, including tablets, for text-processing.

The first is the way in which the space between laptops and mobile phones will evolve. The path we have explored in this chapter relates mainly to exploiting the convenience and portability of the mobile phone by enhancing its text-managing capacity. There is also the possibility that the tablet will down-size towards the mobile phone, creating a general purpose device of lesser portability but greater technological and ergonomic scope. This space is also already being targeted by smaller, thinner and lighter laptops, using keyboards for text entry and editing, but with greater portability than current mainstream laptops. From the point of view of language learning this dynamic competition is to be welcomed. It is to be hoped that the issues of second language learning and MALL will play some part in the realization of new technologies and courseware.

The second possibility brings together second-language learning and transcription systems. This is speculative: to my knowledge it has not been

attempted seriously as a language learning technology. When one installs transcription software the first task is to “train” it by reading aloud a pre-set text, so that the system can establish benchmarks for the individual’s pronunciation patterns, especially vowels. These templates can be modified in later use. If we now imagine a second language learner following this path, there is a danger that the system will be trained by the learner to recognize unacceptable pronunciations which would not be recognized or accepted by a native speaker. But if these templates could be moderated by the software to allow only pronunciations which would be acceptable to a native speaker, then one can envisage transcription software not only as a powerful device for second-language writing, but also for second-language speaking. And we can envisage also a listening activity, since a number of software products provide a “read-aloud” feedback facility.

A third speculative possibility concerns multiple concurrent text creation. If voice-activated microphone input is possible for transcription, one can in principle imagine a Bluetooth-connected microphone and a keyboard providing collaborative text input in real time: only one microphone input is feasible, since transcription systems are trained to individual speakers. Multiple USB-connected keyboards can be used with existing technology for the collaborative production of text. There are certainly technical issues to be addressed here. But this is an example of the ways in which thinking about the needs of MALL could prompt the evolution of technology for the benefits of language learners.

CONCLUSION

We may expect that there will be more than one solution to the problem of text input and editing on mobile communication devices like the phone and the tablet. For some purposes, say in a quiet place, voice recognition may be convenient, fast

and sufficiently accurate. In others, including more public and noisy places, digitally-based input may well be more appropriate, so long as we can resolve the current ergonomic issues. It would be both premature and pusillanimous to simply resign ourselves to the conclusion that text input and editing should be predominantly not for mobile devices.

CALL, and now MALL, have shown a healthy capacity to exploit intended affordances, and to discover unintended ones, in technologies available for teaching and learning. We can therefore present the problem of text input and editing, and especially multilingual text input and editing, as a challenge to those who are currently preparing the future of MALL in language education.

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Chapter 12

Writing Papers Using Nvivo8 and Coh-Metrix

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ABSTRACT

With the release of Nvivo8 in 2008, this chapter first discusses the use of Nvivo8 to conduct a literature review using the writing of this paper as an example. Nvivo8 has overcome a major challenge to a research project of importing sources in pdf formats. It now is also capable of capturing video and audio as secondary data sources. Nvivo8 has been very useful for analyzing literature and theory generation. It is also a good management tool for organizing the sources in any research project.

In the second part of the paper, after writing the chapter with the help of Nvivo8, the use of Coh-Metrix (<http://cohmetrix.memphis.edu/cohmetrixpr/index.html>) will be used to benchmark the quality of the writing against the author's previously published papers. Coh-Metrix is a web-based computer tool that analyzes texts on over 200 measures of cohesion, language, and readability. Its modules use lexicons, part-of-speech classifiers, syntactic parsers, templates, corpora, latent semantic analysis, and other components that are widely used in computational linguistics. Standard text readability formulas scale texts on difficulty by relying on word length and sentence length, whereas Coh-Metrix is sensitive to cohesion relations, world knowledge, and language and discourse characteristics. In this chapter, the author uses argument overlap, latent semantic analysis (LSA), and number of connectives as well as Flesch-Kincaid Grade Level (FKGL) to assess readability difficulty in a number of previously published papers in education and applied linguistics written by the author. This establishes a benchmark for her papers. Then the present paper will be compared against the benchmark for readability.

It is argued that the use of Nvivo8 and Coh-Metrix is capable of increasing the quality of submissions for publication and will be an excellent set of tools for postgraduate students to use for publication purposes.

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INTRODUCTION

In the field of education or applied linguistics, the writing of a paper for submission to conferences or a journal usually starts with a literature review. Nowadays, conducting a literature review is most likely to be done online through searching using various search engines and through library databases. The results of such exhaustive search online are endless pieces of published research and other sources. The researcher, then, has to piece these pieces of research together in order to tell an engaging and fascinating story. As Beekhuyzen (2008) pointed out ‘There is a lack of available practical information on how to conduct a literature review, and there is even less available that use qualitative research software to support the process.’ To address this gap, this paper discusses the journey of an applied linguist using Nivivo8 to write a paper for publication. In this chapter Nvivo8 is proposed as a tool to help any researcher accomplish the task of writing a literature review. A practical example consisting of five steps using Nivivo8 will be described in detail. It is envisaged that using well-known qualitative research software such as Nivivo8 gives researchers new opportunities to save time and energy while maintaining the quality of their work. This chapter is also aimed at postgraduate students and emerging researchers who might not know how to do a literature review and especially how a qualitative research software tool might help in this regard.

It is important to remember that Nvivo8 is a software tool, and it supports the way you work but it does not do the analysis for you. Traditionally Nivivo8 has been used mostly for data collected in the field but now it is being used more regularly for reviewing literature; see the recent paper by Bandara (2006) in which she presents “an illustrative demonstration of Nvivo2 for research management.” However Di Gregorio (2000) started the discussion when she demonstrated the tools in Nvivo2’s toolkit which she believes “support

the various processes and strategies involved in constructing arguments from the literature” (p. 2). More recently, some other papers on how to use the software for research have been published, and are useful in providing advice to researchers (see Dean and Sharp, 2006; Woods and Wickam, 2006 for further reading).

In the second part of the paper, the use of a web-based software Coh-Metrix is discussed as a tool for researchers or postgraduate students to check the readability of their work prior to paper submission.

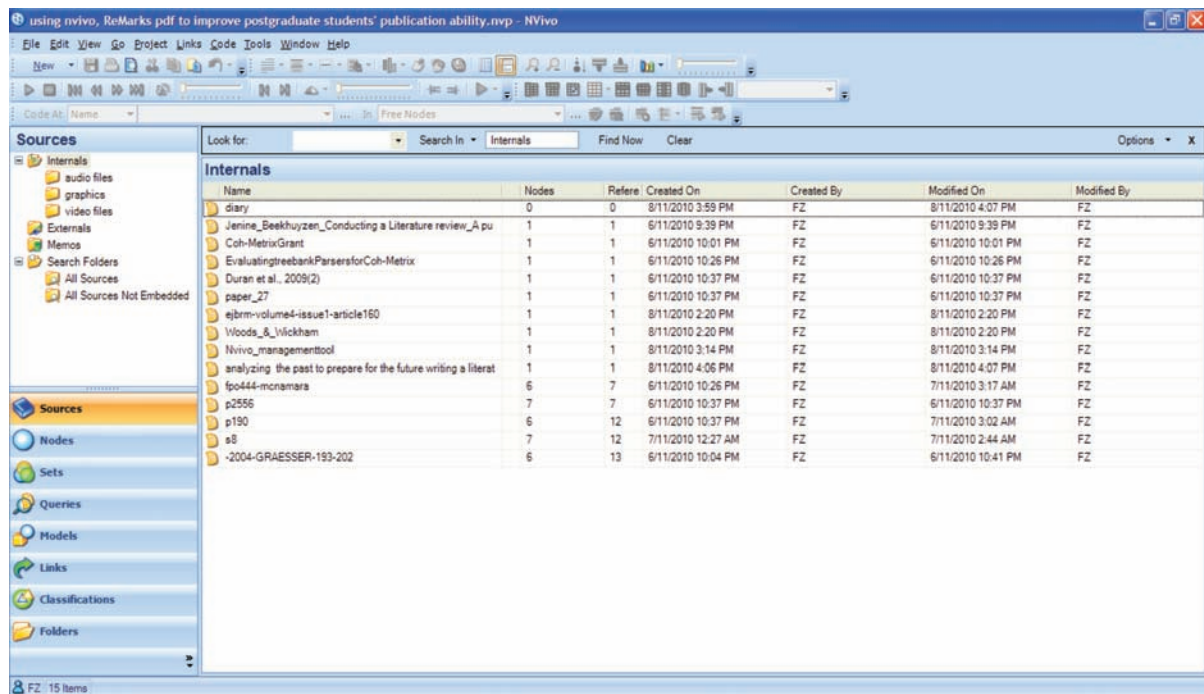
PART 1: CONDUCTING A LITERATURE REVIEW

What is the Purpose of a Literature Review?

The purpose of a literature review is to highlight the discrepancy between what we know and what we need to know in order to situate a paper’s contribution in a specific domain. It will also aim to extend current theories in order to create directions for future research. However, as Webster and Watson (2002) pointed out, extending or developing theories, while a difficult task, it is, nonetheless, the most important part of a review and generally needs the most elaboration.

Di Gregario (2000) further argues that “Literature reviews are a common feature of all dissertations, regardless of discipline or subject matter. However, they are usually overlooked as a form of qualitative analysis, yet the processes involved in building an argument from a body of literature are similar to processes involved in analyzing qualitative data. . . . only Nivivo8 (to date) has a particular set of tools that is ideal for analyzing literature.” (Di Gregario, 2000, p.2). In my projects, Nivivo8 was used here as a qualitative data analysis technique to synthesize and manage the volume of literature. It was also used to gain a holistic view of the current status of research in

Figure 1. Screen capture of the Internals page



the field of education through concept formation and to provide a structured approach to writing a literature review.

FIVE STEPS TO ANALYSING THE LITERATURE USING NIVIVO8

Step 1: Install the Software

The software must be installed before you begin, and the latest service pack should be installed (check for updates – help menu). It is good practice to check for updates every few months if you have not set the software to do this for you. Many universities now have a site license making access to the software relatively simple.

Once installed, start the software. It is now available in Chinese, Japanese and Spanish in addition to English so choose your preference from the start menu. Then you will be prompted for your name and initials so that, if you are working on

a collaborative project, your initials will identify you as the author of changes made to the project. From the next screen, click on ‘new project’ to create a new project.

Step 1a: Set up Your Project

The name Internals is now given to the top folder in the navigation view (see Figure 1). This folder is where all your data sources are stored. In Nivivo8, document files, audio, video and graphic files can be imported into this folder. However, it might be advisable to create sub-folders under the ‘internals’ folder to store multi-media materials separately. This can be done by right click (on your mouse) on the word ‘internals,’ then create a new folder, call it, ‘audio files’ for all audio files for interviews.

Step 2: Import Literature

Move your cursor to the internals window and then right click on the white space in the Internals

window (Figure 1). Then click on 'New Internal' to create a project journal or log book. Bandara (2006) and Beekhuyzen (2008) both recommend that you write in this file each time you do any work with a nominated date and time that you begin the work. This will be particularly important for postgraduate students to show their supervisors or colleagues their work.

To import sources you have already found from database and web searches, right click on the white space in the internals and then click on 'import internals.' Nivivo8 now can import a large range of documents including pdf documents. Online publishers are also increasingly producing high quality pdfs so that documents can be imported into a database like Nivivo8. However, importing older materials which are not online is a still a bit problematic.

Import each file and give it a description. At this time you have the option to make each document into a case. A case is a way of gathering together all the content that belongs to that entity. Say, you have just imported the paper 'Analyzing the Past to Prepare for the Future: Writing a Literature Review,' you then can add attributes to each case (in this case the document) such as date imported (date), source type (journal/conf/book/web) and whether it has been coded (yes/no). Attributes allow you to ask questions of your data based on selected values of attributes.

While you are importing and reading through your document, you might want to add links such as memo, annotation or hyperlinks. These links can be added to any sources and are similar to writing in the margin of a paper. You can also link to other links from an object to another object.

Step 2a: Using the Casebook

The casebook can be a useful feature when conducting a literature review. When importing each file, you can choose to create a case for each document just by ticking the 'create case' box. However, if you have already imported a

document, you can still create a case for this by selecting the required source (e.g. Analyzing the Past to Prepare for the Future: Writing a Literature Review). Then right-click and choose 'code sources,' then At Existing Nodes. Then select Project item dialog is displayed. Select the Cases folder to display all cases and click the checkbox next to the 'Analyzing the Past to Prepare for the Future: Writing a Literature Review's case. Then click 'ok.' You also need to create attributes.

For example, to create an attribute 'location' to indicate which country the paper is written for, in Navigation View, click on 'Classifications.' Select the 'Attributes' folder. In List View, right-click and choose 'New Attribute.' The 'New Attribute' dialog is displayed. Enter a name for your attribute in the 'Name' field (e.g. Location). If required, enter a description of the attribute in the 'Description' field. Select the attribute type from the 'Type' list. Choose from String, Number or Date. Click on the 'value' tab to define the value for the attribute. Then click on the 'add' button. Enter the name of the value in the 'Value' cell (e.g. USA). If required enter a description of the value. Repeat the process to add more values as needed. Click on the 'Default' checkbox to specify that new cases will be allocated this value as a default. Click 'ok' when you have finished adding attribute values.

But what is the use of creating a casebook? It enables us to run queries and filter the responses by fields in the casebook. For instance, for this paper, I recorded the attributes to include the types of paper and the location of the paper and the year of the paper. It is then possible to, say find all papers published within 2000 and 2010 by clicking on the hour glass symbol on the right hand corner of each attribute and set up the filter to be greater than 01/01/2000, then click ok. Then the only item fits the criteria is displayed. Doing this allows me to look at the latest research on a topic. I can also classify research papers according to experimental design by setting up more attributes. This was useful to help me find information

Table 1. Concept matrix

Articles	Concepts				
	Communication strategies	B	C	D
1		x	x		x
2	x	x			
			x	x	

quickly and to position my own research and the contribution it makes to the field.

Though Nivivo8 is very user friendly, it is still advisable to go through the flash tutorials which give overviews of using the software and its various features. Furthermore, if you are really in trouble, pressing F1 at any time displays the detailed help. The online forum and QSR helpdesk can also be invaluable resources. If you want to look at a sample project, one that has been freshly and successfully ‘cooked,’ then the volunteering sample project is useful to look at sample queries, models and node structures to get ideas.

CONCEPT-CENTRIC LITERATURE REVIEW

A literature review should focus on concepts. It should cover relevant literature on the topic and is not confined to one research methodology, one set of journals, or one geographic region. Most of all, a literature review should be concept-centric (Webster & Watson, 2002). This means using concepts to determine the organizing framework of a review. It is not just a summary of the relevant articles.

Webster and Watson (2002) further advise the construction of a concept matrix which is shown in Table 1:

A concept could be, say, ‘communication strategies.’ While you are reading, enter the concepts into the concept matrix (Table 1).

Step 3: 1st Round of Coding

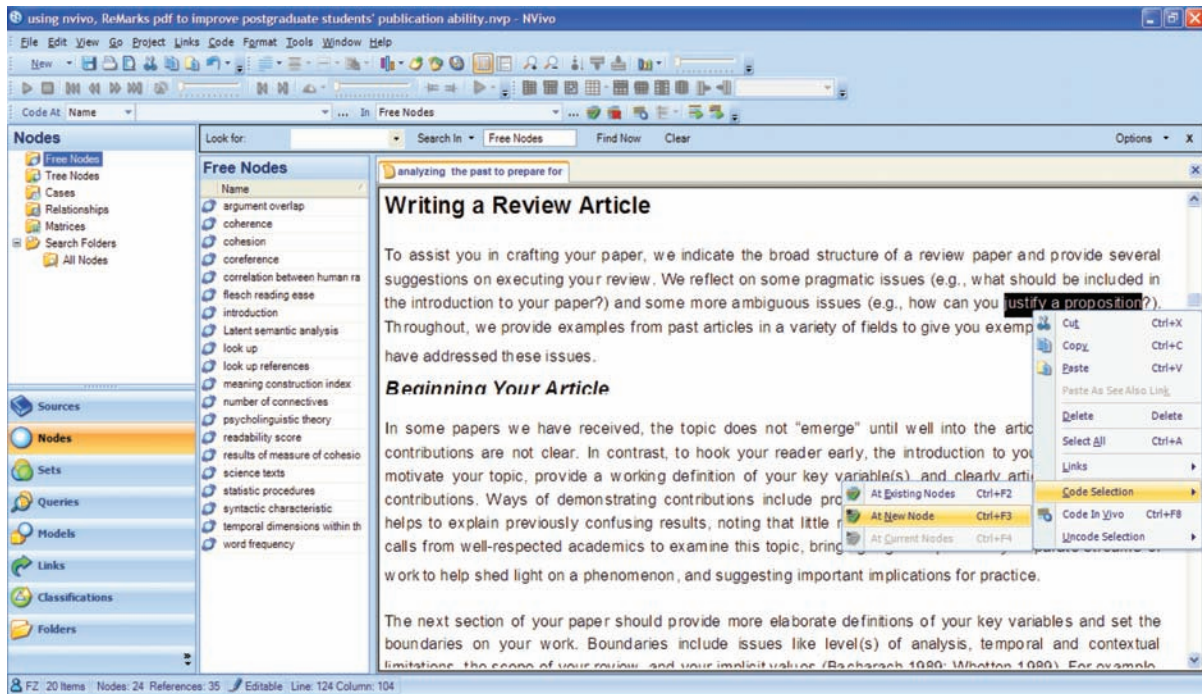
Nodes in Nivivo8 should be considered as containers for concepts and information related to a particular concept. The free nodes are the concepts you will use to structure your literature review. When you see concepts in the literature that you want to code, highlight the text, right click and create a new free node from the selection (Figure 2). To create a free node, open your document you want to code. Then from the navigation menu (bottom of the screen), choose ‘nodes.’ Because I have already created 24 nodes for the following document, they become hard to see if they are above the source document you are reading. So I solve this problem by clicking ‘view’ and then the ‘detail view’ to select the right of the screen option (‘view – detail – right’). I now want to create a new free node ‘justifying a proposition.’ I then select those words in the text, then right click to open the node dialog, then select ‘at new node.’

This opens up the new node dialog in which you can create a name for your node and decide whether you want to put it as a free node or a tree node. You can also ‘code on’ from within a node. ‘Coding on’ refers to coding from the already coded node.

Code in Vivo

Another option to create nodes is by clicking on ‘Code in Vivo.’ In-Vivo coding turns the exact words selected into the name of the node in the coding process. Continue the process of creating

Figure 2. Screen capture of a page creating a new node



nodes and coding until you reach the end of your document. This process should be repeated with all your imported documents. Once done, the structuring of the codes can begin.

Some writers prefer keeping the codes rather broad and high level at this stage (Beekhuyzen, 2008) and later on you can break them down into tree nodes. I prefer to continue to create free code so that my thought patterns are not interrupted while I am reading.

Auto Coding

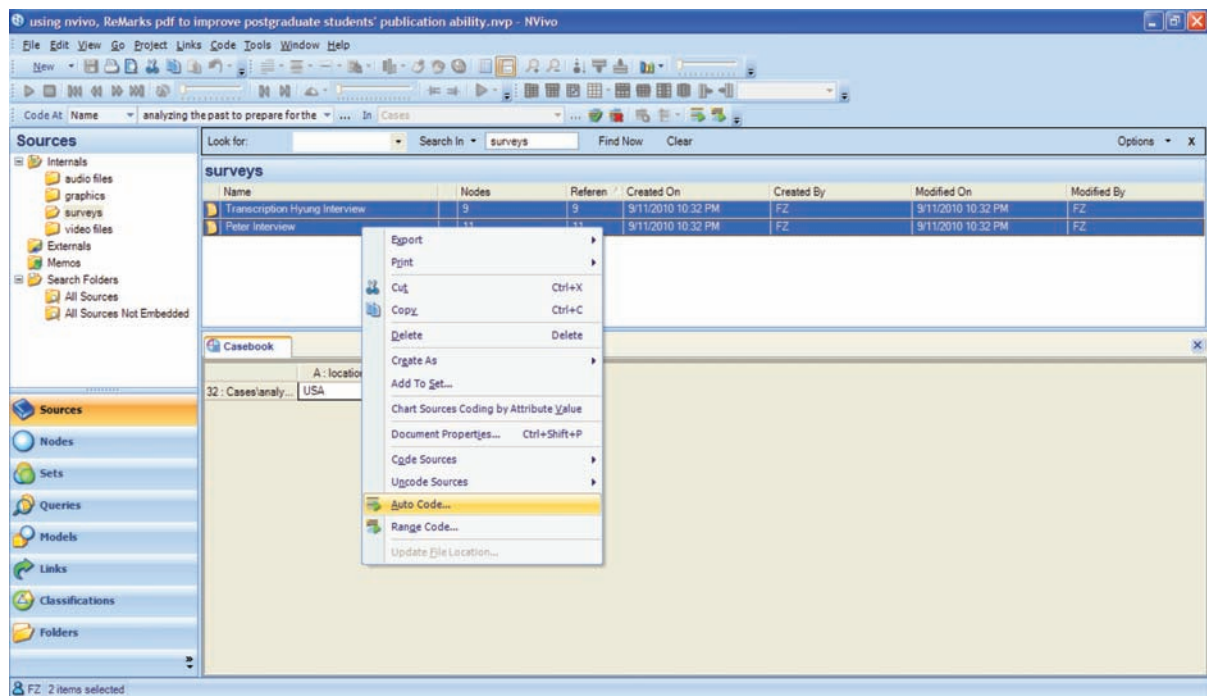
Another very useful feature is ‘Auto coding.’ Auto coding is very useful for questionnaires or interview data particularly when you use the same guiding questions in your survey instrument. If you have applied paragraph styles consistently in your document sources, then you can use them to auto code. For instance, in my project, I have two interviews in the folder under ‘internals’ called ‘surveys.’ When I click on that, two interviews

appear (Transcription Hyun Interview and Peter interview). I select both of the interviews and the right click to bring up the coding selection window. Choose ‘auto code’ (Figure 3).

Then the Auto Code dialog is displayed. From the Available paragraph style list, select the required styles (in this case Heading 2) and then select the right arrow to add the styles to the selected paragraph styles list.

Then select the Code at Nodes panel to store the nodes at a new tree node (e.g. interview questions if you want to differentiate interview questions from questionnaire questions). Click ‘ok.’ Your new node should now appear under the tree nodes. If you want to check that this is working, in Navigation View, click on Nodes. Go to ‘Tree nodes.’ Find the node ‘interview questions.’ Click the + sign next to the Question Node in the List View to expand all the new tree nodes under that node. Then open any of these nodes to view all the answers to that particular question for all interview participants. You can

Figure 3. Screen capture of how to auto code



now read the content of this node which contains responses from all participants for this question. This is extremely useful if you are dealing with hundreds of interviews.

Step 4: Structuring Nodes

Once you have created free nodes and they have been coded to, then it is time to structure your nodes. In one project, I had 146 free nodes when I finished the first round of coding. There are clearly too many nodes. So I decided to combine some nodes and move some free nodes into tree nodes. Tree nodes, like a tree branch, consisted of a trunk node such as 'questions' and then branch nodes or sibling nodes (nodes on the same level) or children nodes (nodes under the trunk node). You are creating some hierarchy when creating a tree node. For instance, under the tree node 'questions,' I created 'interview questions' and 'survey questions' under that node. The process of structuring free nodes into tree nodes can be

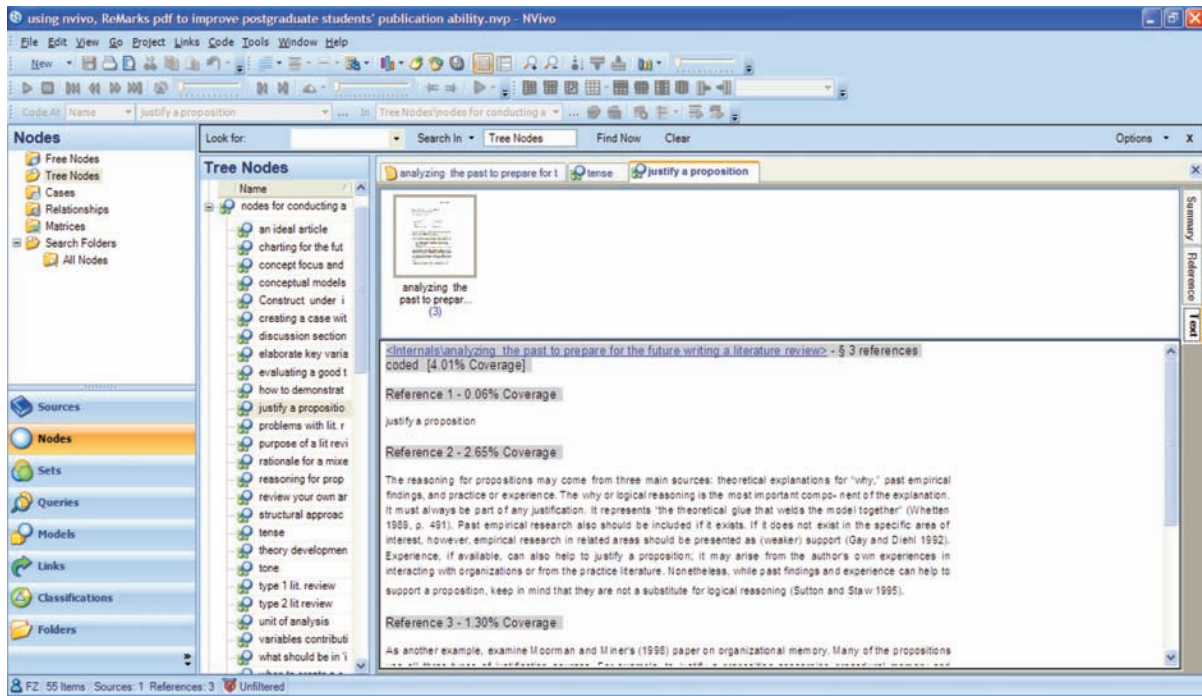
done by copying or moving a free node, and then pasting it into the appropriate place in the tree node. Sometimes, copying is safer as you will not lose any coding if things go wrong. In Nivivo8, fortunately there is an undo button for you to undo your previous action.

The structuring of free nodes into tree nodes achieves the aim of creating a focus on the filtered literature for further coding. Sub-nodes can be further broken down into more child nodes until you deem your coding to be complete. You can use 'coding on' to code text within a node further.

Step 5: Analysis

Once you have coded to a level your documents, you need to make sense of your coding. For instance, to write a summary of how to do a literature review according to Webster and Watson (2002), I open the following node and the following (Figure 4) is displayed.

Figure 4. Screen capture of a page displaying content of a node



The information contained under a node can be displayed in summary, reference and text formats (see the upper right hand corner). In ‘text’ format, you get the content of the nodes as well as the source document. When you click to open the source document, the coded paragraphs will be highlighted. Once copy and pasted into your document, you can edit the information by editing these paragraphs.

OTHER USEFUL TIPS FOR CODING

Coding Stripes

Coding stripes are useful indicators. During coding they can be used to get a quick view as to whether and where a piece of text has been coded. To turn this one, click on ‘view’ on the tool bar and choose coding stripes. They are also able to show other literature that has been coded to a particular node. This establishes a thread between papers in the

literature review which enables this to be made explicit during writing.

Memos, annotations can also be useful to record thoughts that you might want to follow up on. These can be easily created anywhere by just right click on the mouse and then select ‘links.’

When writing a literature review, Nivivo8 helps you develop a logical approach to grouping and presenting the key concepts you have uncovered. After writing the literature review, synthesize the literature by discussing each identified concept.

In conclusion, an ideal literature review (Taken from Webster and Watson, 2002, p. xxi):

- motivates the research topic and explains the review’s contributions
- describes the key concepts
- delineates the boundaries of the research
- reviews relevant prior literature in ... related areas
- develops a model to guide future research

- justifies propositions by presenting theoretical explanations, past empirical findings, and practical examples
- presents concluding implications for researchers and managers.
- And on top of this, the exemplary review article should be explanatory and creative!

PART 2: USING COH-METRIX TO CHECK THE QUALITY OF YOUR WORK

Coh-Metrix (Graesser, McNamara, Louwerse, & Cai, 2004) is an online-web based computer tool which analyzes texts on over 200 measures of cohesion, language, and readability. It uses components such as lexicons, part-of-speech classifiers, syntactic parsers, templates, corpora, latent semantic analysis which are used widely in computational linguistics. After the user enters an English text of 1500 characters, CohMetrix returns measures requested by the user. Previous readability scales based on traditional readability formulas such as Flesch Reading Ease (Flesch, 1948) and Flesch-Kincaid Grade Level (Kincaid, Fishburne, Rogers, & Chissom, 1975) have been accepted by the educational community. However, “they have been widely criticized by researchers for their inability to take account of deeper levels of text processing (McNamara, D. S., Kintsch, Butler-Songer, & Kintsch, 1996), cohesion (Graesser, et al., 2004; McNamara, D. S., et al., 1996), syntactic complexity, rhetorical organization, and propositional density (Brown, 1998; Carrell, 1987)” (p. 1).

Crossley, Greenfield and McNamara (2008) further pointed out “Coh-Metrix offers the prospect of enhancing traditional readability measures by providing detailed analysis of language and cohesion features through integrating language metrics that have been developed in the field of computational linguistics (Jurafsky & Martin, 2000). Coh-Metrix is also well suited to address

many of the criticisms of traditional readability formulas because the language metrics it reports on include text-based processes and cohesion features that are integral to cognitive reading processes such as decoding, syntactic parsing, and meaning construction (Just & Carpenter, 1987; Perfetti, 1985; Rayner & Pollatsek, 1994).”

In L1 language research, matching the readability of texts to the reading ability of readers has been a challenge. It is even more challenging for L2 readers. In this chapter, the author proposes to use Coh-Metrix to check students’ writing so that teachers can use such information to provide feedback to either L1 or L2 students. To achieve this ultimate aim, it is necessary to first ascertain whether it is possible to determine what constitutes a good paper or essay at postgraduate level for university students in the field of education. This chapter explores two new questions:

1. Is it possible, from studying research in this area, to ascertain what constitutes a good essay or paper at a postgraduate level in the field of education using features reported by Coh-Metrix?
2. If so, can we teach postgraduate students how to write better papers?

To answer question 1, the author use coreference indices such as noun overlap, argument overlap, stem overlap and latent semantic analysis (LSA), Flesch Reading Ease as well as Flesch-Kincaid Grade Level (FKGL) to assess readability difficulty in a number of previously published papers in Education and applied linguistics written by the author. This establishes a benchmark for her papers.

Coreference Indices

Coh-Metrix provides three general types of coreference indices. Noun overlap is overlap between nouns, with no deviation in form.

Table 2. Examples of causal, additive, temporal and clarification connectives

Connective Type	Examples
Causal: Positive	a consequence of, after all
Causal: Negative	nevertheless, nonetheless
Additive: Positive	also, as well, further
Additive: Negative	anyhow, on the contrary
Temporal: Positive	suddenly, up to now, when
Temporal: Negative	until, until then
Clarification	that is to say, for example

Argument overlap is overlap between the noun in the target sentence and the same noun in singular or plural form in the previous sentence. Stem overlap is overlap from the noun to stems, regardless of word type (e.g., noun, verb, adjective). Thus, stem overlap could include overlap between giver in the target sentence and giver, giving, or gave in previous sentences. Both argument and stem overlap also include overlap between a pronoun and the same pronoun.

Coreference indices also vary by distance between the target sentence and coreferent sentences. Adjacent overlap includes only adjacent sentences. Distances of two or three sentences include the target sentence and the two or three previous sentences, respectively. All distances consist of the overlap between each sentence with all other sentences in the text – this is intended as a more global index of cohesion. (McNamara, D. S., Ozuru, Graesser, & Louwerse, 2006, p. 3).

In comparing texts with high cohesion with texts with low cohesion, McNamara, Ozuru, Graesser and Louwerse (2006) found that high cohesion texts tended to have higher indices in Noun, Argument and Stem overlaps. The texts examined in McNamara et al.’s study were 19 texts of various genres with grade levels from grade 4 to college level. They compared the high cohesion version

of each text to the low cohesion version of the same text in order to establish a benchmark of high cohesion texts.

Latent Semantic Analysis

Coh-Metrix also includes six types of Latent Semantic Analysis (LSA) indices: adjacent sentence to sentence, sentence to all other sentences, sentence to paragraph, sentence to text, paragraph to paragraph, paragraph to text. In McNamara et al.’s study (2006), four of the six LSA indices showed significantly higher cohesion scores for the high as compared to the low-cohesion versions. They are: adjacent sentence to sentence; sentence to all sentences; sentence to paragraph; and sentence to text. These four indices are also adopted in this study as a benchmark for the author’s papers.

Connectives and Causal Cohesion

Another element of text cohesion comes from connectives. Connectives provide explicit cues to the type of relationship between ideas in a text, and thus increase text cohesion (Louwerse, 2001). Coh-Metrix provides an incidence score (occurrence per 1000 words) for four general types of connectives: causal (negative, positive), additive (negative, positive), temporal (negative, positive), and clarification. Examples of each are provided in Table 2.

Coh-Metrix provides additional indices of causal cohesion by measuring the ratio of the incidence of causal particles to causal verbs (i.e., causal particles/causal verbs+1). Causal verbs convey an action that impacts upon another entity such as the verb impact. The assumption of such an index suggests that when a causal verb such as 'impact' is used, for a highly cohesive text, the author is very likely to spell out the result of the verb 'impact' in subsequent sentences. This will usually involve causal connectives such as 'because' or an adverbial phrase such as 'as a result.' Coh-Metrix estimates causality in a text by the number of causal verbs conveying an action that impacts another entity. If there are numerous causal verbs without causal particles, then the reader needs to infer the relationships between causal events/actions conveyed by each sentence. The results indicate that the higher cohesion texts investigated in McNamara et al's work (2006) contained more causal particles and positive causal connectives, and that the ratio of causal particles to verbs was greater. So the Causal cohesion (CAUSC) is a good indicator of cohesion especially in scientific or college level texts.

Flesch Reading Ease and Flesch-Kincaid Grade Level (FKGL)

The output of the Flesch Reading Ease formula is a number from 0 to 100, with a higher score indicating easier reading. Important components of this measure are:

ASL = average sentence length = the number of words divided by the number of sentences and,

ASW (comes from CELEX database) = average number of syllables per word = the number of syllables divided by the number of words.

This more common Flesch-Kincaid Grade Level formula converts the Reading Ease Score to

a U.S. grade-school level. The higher the number, the harder it is to read the text.

Index Semantic Similarity

The index semantic similarity measures similarity from sentence to sentence, adjacent, mean measures the uniformity and consistency of parallel syntactic constructions in text. The index not only looks at syntactic similarity at the phrase level, but also takes account of the parts of speech involved. It is based on the assumption that the more uniform the syntactic constructions are, the easier the syntax will be to process. This measure also takes into account how the reader handles words as they are encountered on the page. Reading research suggests that a reading text is processed linearly, with the reader decoding it word by word; but, as he or she reads, the reader is also assembling decoded items into a larger scale syntactic structure (Just & Carpenter, 1987; Rayner & Pollatsek, 1994). While still in the course of reading a sentence, readers also form expectations as to how it will end. These factors of potential difficulty are measured by the Coh-Metrix semantic similarity index. To make reading easier, the higher this index is the better.

Benchmarking Published Papers

I have chosen two papers for this benchmarking exercise. All papers are from the field of education. Because these are different types of papers but written by the same author, it will be interesting to see whether there might be differences in their readability as measured by the features of the texts (Table 3, Table 4, Table 5).

In conclusion, a highly cohesive paper should have a higher causal cohesion, Co-references indices and LSA indices, shorter sentences and not too many words before the main verb.

Table 3. Coreference indices (means of papers) by cohesion as a function of the type of index (noun, argument, stem), distance (adjacent, 2 sentences, 3 sentences, all distances)

type	distance	FZZ, n=2	McNamara et al(2006) papers, n=19
Noun	Adjacent	0.646 (0.21)	0.53 (.16)
Argument	Adjacent	0.718 (0.16)	0.58 (.15)
Stem	Adjacent	0.787 (0.065)	0.61 (.16)

Note: standard deviations are in parentheses.

Table 4. The mean scores of the three LSA indices for the McNamara et al. (n=19) and FZZ papers (n=2)

LSA Index	FZZ papers, n=2	McNamara et al(2006) papers, n=19
Sent. To Adj. Sent	0.375(0.10)	0.27 (0.12)
Sent. To all Sent.	0.293(0)	0.24 (0.11)
Sent. To para	0.408(0.05)	0.33 (0.12)

Note: standard deviations are in parentheses

Table 5. The mean scores of causal cohesion index, Flesch Reading Ease, and Flesch-Kincaid Grade Level for two papers written by the author

Causal cohesion index	Flesch Reading Ease (0 to 100)	Flesch-Kincaid Grade Level
0.65	37	12

How to Write Better and More Cohesive Essays

First of all, it is worthwhile to remember when writing a paper for publication or for assessment, one of the most important considerations is how the readership will react to your paper. Will the reader have to work too hard to read your paper? Will the reader get annoyed by the tone of your paper? Will they feel that they are getting something out of it? In other words, is there a payoff at the end of the paper? Will this motivate them to look up the references and learn more?

Will the Reader Have to Work Too Hard to Read Your Paper?

How hard they have to work at reading your paper depends on how cohesive your paper is. Various

indices in Coh-Metrix can give you some information on how cohesive your paper is. However, it is still up to you to work on your paper to make it more cohesive. The degree of cohesion in your paper depends on the background knowledge of your readership. There is no absolute rule about how cohesive a paper should be in order to qualify as a ‘good’ paper. For instance, McNamara and colleagues have discovered some intriguing interactions between cohesion and world knowledge when students construct and subsequently use mental models underlying science texts (McNamara, D.S., 2001; McNamara, Danielle S., Kintsch, Songer, & Kintsch, 1996). They found that readers with less prior knowledge about the science domain are helped by texts with better cohesion, whereas readers with greater science knowledge find filling in the cohesion gaps themselves makes reading such texts more interesting...

In other words, when inferences are generated, the reader makes more connections between ideas in the text and knowledge.

Will the Reader Get Annoyed by the Tone of your Paper?

In their paper for writing a literature review, Webster and Watson (2002) suggest that one should not be overly critical. It should “constructively informs the reader about what has been learned.” This advice should be adhered to when writing your own paper too. They further point out that “reviewers are looking for contribution (“what’s new?”), impact (“so what?”), logic (“why so?”), and thoroughness (“well done?”). You will be well on your way to a publishable paper if you can address these four major concerns when first submitting your paper”(Webster & Watson, 2002).

CONCLUSION

This chapter set out to illustrate the use of Nivivo8 to write a literature review. Combined with the advice on how to write a good literature review from Webster and Watson (2002), a literature review can be structured through the use of the content of the nodes in Nivivo8. Using Nivivo8 to code literature makes one to think about structure while reading the literature. Nivivo8 also allows all sources, documents, video and audio, to be stored in one place online.

The second part of the chapter describes the usefulness of Coh-Matrix for benchmarking publishable papers. Two papers written and published by the author have been compared to 19 highly cohesive texts analyzed in McNamara et al.’s paper (McNamara, D. S., et al., 2006). It was found that the author’s papers are comparatively cohesive compared to those used in McNamara et al.’s papers. Since these papers have all been published, it can be assumed that an examination of causative cohesion index, argument overlap,

latent semantic analysis indices, Flesch Reading Ease, and Flesch-Kincaid Grade level can help writers and postgraduate students to gauge the quality of their work.

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