Continuous Speech Recognition: An analysis of its effect on listening comprehension, listening strategies and notetaking

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Tom McIvor

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Declaration

I declare that this thesis is all my own work except for those references that I have acknowledged in this study and that this material has not been included in a thesis or report submitted to Massey University or any other university for a degree or other qualification.

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Tom McIvor

Candidate for EdD

Abstract

This thesis presents an investigation into the effect of Liberated Learning Technology (LLP) on academic listening comprehension, notetaking and listening strategies in an English as a foreign language context (L2). Two studies are reported: an exploratory study and subsequent main study. The exploratory study was undertaken to determine L2 and native speaker (L1) students' perceptions on the effectiveness of the technology on academic listening and notetaking. The main study took a more focused approach and as a result, extended the exploratory study that was done in an authentic lecture context in order to gather data to measure listening comprehension and notetaking quality.

The participants in the main study comprised six L2 students: five of whom intended to go to university. The methodology was a multi-method one: data was gathered from notetaking samples, protocol analysis, email responses and a questionnaire.

Results indicated that continuous speech recognition (CSR) has the potential to support the listening comprehension and notetaking abilities of L2 students as well as facilitate metacognitive listening strategy use and enhance affective factors in academic listening.

However, it is important to note that as CSR is an innovative technology, it first needs to meet a number of challenges before its full potential can be realized. Consequently, recommendations for future research and potential innovative uses for the technology are discussed.

This thesis contributes to L2 academic listening and notetaking measurement in two areas: 1. the measurement of LLP-supported notetaking; and, 2. the measurement of LLP-supported academic listening comprehension.

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CHAPTER ONE

Background

1.1 Statement of problem

Increasing numbers of foreign students are studying in English speaking universities (Flowerdew & Miller 1997:27). Lectures can place a considerable processing burden on these English as a second language students or L2 students as they are referred to in the literature. These L2 students have to listen to lectures 'in real time' and this aspect provides a major challenge for them both linguistically and cognitively (Thompson 2003:5). As a result, many often do not succeed in getting the main points of lectures (Jung 2003:562). In addition, according to Paez and Raciti (2002), university students are generally not taught how to record quality notes and can find it difficult to adapt to the learning process at university.

English for Academic Purposes (EAP) programs are designed to prepare L2 students for academic listening and they have traditionally depended upon textbooks and audio-tapes for teaching materials. Teachers expect these texts and materials to break what is referred to as "the negative cycle of expectation" (Miller 2002:152).

In this cycle, lecturers perceive that students lack both the linguistic skills and the necessary background knowledge to understand lectures. As a result, they may prepare detailed notes for students. These notes may prompt L2 students to tune out of lectures either because they refer to the lecture notes for comprehension or because they find the lecturer difficult to understand. In turn, lecturers attribute this tuning out to low-level language proficiency or to a lack of basic knowledge among the students. As a solution, the lecturer may prepare more detailed notes which completes the cycle (Miller 2002:152).

Todd (2003:149) criticised EAP programs for having so far focused too much on texts and materials or on the 'what to teach' to the neglect of methodology or the 'how to teach'. Todd states that while some attention has been paid to EAP methodology, there is a need for a much greater focus on teaching. If L2 students find academic listening challenging, then it may follow that educators need to improve 'learning to listen' situations for those students. Research into Liberated Learning Technology (LLP) as a teaching tool with which to support academic listening in the L2 classroom may give some insights into 'how to teach' academic listening skills. The integration of this innovative technology into an L2 academic listening course may contribute to the design of an academic listening skills methodology.

1.2 Significance of Study

Educational technology has contributed to knowledge and learning by facilitating the acquisition and distribution of learning materials. Examples of this development are: virtual classrooms that can facilitate study on the Internet; digital libraries that can be searched for information; materials for tutorial discussions that can be emailed (Tsichritzis 1999:93). To complement this development, a number of universities have designed undergraduate multimedia degrees (Gonzalez et al. 2000:89).

Garret (1999) in Wildner (1999:228) asserts that there is a pressing need for L2 teachers and students to be made aware of how each item of multimedia technology is employed to support language learning. She further states that a precondition of this requirement is that the language learning process needs to be understood first. As a preliminary step to facilitate awareness, research data is required that investigates the effectiveness of computer-based technologies that are employed to teach language skills in specific language learning contexts (Wildner 1999:228).

The present investigation is unique in that it employs Liberated Learning Technology (LLP) for the first time in an L2 classroom setting to assist undergraduate students with preparatory work for future university courses by aiming to support the academic listening and notetaking skills of the students. In this investigation, academic listening is used as an umbrella term for a combination of listening comprehension, listening strategies, and related affective strategies.

Language teachers today are required to address issues connected with items of innovative technology referred to as *technological pull*. These issues can impact directly on teaching and learning in a second language. The effect of this impact is referred to as *technological push* where teaching and learning can be measured by assessment that in turn informs instruction (Wildner 1999:225). A synergy needs to be achieved between these two concepts so that technology can be used effectively in language learning contexts. Two major questions arise in this regard: firstly, can present technologies support teaching and learning (Wildner 1999:225); and secondly, how can present technologies be integrated into instruction? (Adair-Hauck et al. 1999:271).

With regard to technology enhanced language learning, a number of factors have to be taken into account. These include type of software, how the software can be integrated into a language course, the language abilities of students, and finally the specific purposes for which the technology is being employed (Adair-Hauck et al. 1999:270-271). The present study takes account of these factors in its design. For example, with regard to specific purposes, this investigation focuses specifically on the language skill of academic listening in an L2 university preparatory context.

It is important that educators understand that technology is a medium and not a method for L2 instruction (Adair-Hauck et al. 1999:272) and that teaching and learning are dependent on the interaction of teachers and students with each other and with the technology (Tudor 2003:9).

In fact, research has shown that the use of technology as a teaching tool does not guarantee learning (Littlejohn 2002:166). To be successful, technology needs to be able to work with students in their 'ecosystem' to achieve learning objectives (Tudor 2003:3). This ecological perspective highlights the 'relationships and dynamics' between participants in a classroom environment (Looi 2001:14). There is a tension between the ecological perspective whose focus is on students in the classrooms and the technological perspective. The former asks educators to stop and think while the latter aims to deliver on learning objectives. For instance, the ecological view looks at learning situations on an individual student basis thus taking into account the human factor in the classroom. In other words, teachers and students can support each other to enhance learning (Tudor 2003:5). It seems, however, that some universities can emphasise technology over course objectives or what students actually need to achieve on a course (Littlejohn 2002:168). A consideration of students' needs could encourage participants in a learning ecology to reflect on how to use technology effectively (Looi 2001:15).

The present study aimed to employ LLP Technology as a tool to support L2 students' learning needs in the areas of academic listening comprehension, notetaking, and listening strategy use including affective strategies while also taking account of individual differences in levels of listening ability among the research participants.

1.3 Research Questions

This study aimed to investigate the effect of Liberated Learning Project (LLP) Technology when employed as a teaching tool in an L2 listening comprehension and notetaking context. The following questions directed this investigation:

1. To what extent, if any, does LLP affect notetaking skills?
2. To what extent, if any, does LLP affect lecture comprehension?
3. To what extent, if any, does LLP affect listening strategies?
4. To what extent, if any, does LLP have an effect on affective factors?

1.4 Organisation of the thesis

A brief description of the contents of each chapter is presented below.

Chapter one describes the importance of the study and clearly states the question under investigation.

Chapter two presents a review of the literature related to the psychological aspects of L2 listening comprehension as influenced by working memory, cognitive load theory, and listening strategies including affective strategies. This is followed by a review of multimedia in education. Finally, lectures
and their relation to notetaking and listening comprehension are described in detail. In this way the review moves naturally from the processes involved in L2 listening through to the content of lectures as it affects listening comprehension and notetaking.

Chapter three describes the exploratory research that was carried out using the LLP Technology in the lecture theatre.

Chapter four contains a framework for the present study and tries to incorporate and combine salient points from the literature review to represent the study.

Chapter five contains a description of the method employed in the present study.

Chapter six presents the results of the study.

Chapter seven provides a discussion on the results of the research.

Chapter eight contains a reflective evaluation of the study and provides recommendations for future research and uses.

Appendix M serves a dual purpose in that it not only contains the raw data for this investigation, but also includes lists of lecture content vocabulary and thus it is an indicator of the difficulty level of that vocabulary.

The researcher has used the acronyms LLP (Liberated Learning Project) and CSR (continuous speech recognition) interchangeably in this study to refer to the actual technology as it is employed in this investigation. In reality, LLP refers to a concept while CSR refers to what the technology actually does; namely, to recognise continuous speech and display it visually on a screen.

1.5 Researcher Role

As an experienced language teacher, the researcher was initially invited to participate in an exploratory study of LLP (Ryba et al. 2004). The findings of the study indicated a need for a more focused study on the effect of LLP Technology on listening comprehension, strategies and notetaking. The researcher's experiences of teaching listening comprehension and notetaking gave him first-hand experience of the anxiety that difficulties with listening skills can engender in L2 students. In his teaching, he has constantly tried to lessen anxiety among students during listening skills practice. This has often proved to be a difficult task especially when the students were of low language ability. Therefore, being intrinsically motivated to search for a solution to problems encountered during his listening skills classes, he enthusiastically embarked on this study.

CHAPTER TWO

Literature Review

2.1 Introduction

In this chapter the literature surrounding the psychology of listening is reviewed with a special focus on how it relates to academic listening and notetaking. The author first describes the listening process in relation to short-term and long-term memory to show why it can be challenging for L2 students. Secondly, the following three key studies undertaken by Goh are reviewed briefly: 1. (1998) an investigation into L2 listening strategy use; 2. (2000) a study of listening problems; and, 3. (2002) an investigation into comprehension processes. Goh employed verbal protocol analysis in the aforementioned investigations and as such informs the research methodology in the present study to some degree. Goh is followed by a systematic review of information processing that highlights listening difficulty in relation to listening to lectures. A review of multimedia follows. Subsequently, literature on lectures and related topics is reviewed and is followed by a discussion on notetaking with specific attention paid to measurement.

Following Ryan (2001:290-291), L1 or native speaker students are better able to process the large amounts of verbal information contained in lectures as a result of having larger working memory capacity and superior verbal skills. L2 students or English as a second language students can generally be disadvantaged in the area of processing by having limited short-term working memory capacity (Goh 2000:67).

2.1.1 Working memory

Baddeley (1986) defines working memory as a system of limited capacity that deals with all complex cognitive activities such as language comprehension. It comprises a central executive with two slave systems: the phonological loop and the visuo-spatial sketchpad (Gyselinck et al. 2000:168). The phonological loop stores information about words heard and the visuo-spatial sketchpad stores visual information (Gathercole 1999:410). The phonological loop has a phonological store. Thus it functions as a phonological short-term memory or STM (Ceponiene et al. 1999:709).

The listening process in working memory at a basic or bottom up processing level works as follows: firstly, spoken input is stored in physical form and it can be disrupted by subsequent speech material; for example, the sounds *kaet/cat* and *zoo/zu:* are heard. Then, the sounds heard are analysed and segmented into phonemes or meaningful sounds that become / kaet/ / zu:/ in phonetic script. These sounds are stored in the phonological loop and some information is lost; for example, /kae-/ /zu-/ represent the remaining phonological traces.

This remaining information is rehearsed and coded temporally so that it can be recalled in a serial fashion. Words are then retrieved through the phonological traces and are reconstructed from stored word meanings and phonological information to make / kaet/ and /zu:/ (Gathercole 1999:413). This information is stored in long-term memory or LTM (Baddeley et al. 1998:169).

2.1.2 Listening Stages

One unique study into the listening capabilities of L2 students in relation to their ability to comprehend lectures was undertaken by Goh (2000). Goh employed verbal protocol analysis to investigate the occurrence of listening problems at three stages of listening. According to Goh (2000), the listening process comprises three stages: perceptual processing; parsing; and utilization. Perceptual processing is the stage at which sounds are translated into words. These words are then put into grammatically correct informational units or propositions at the parsing stage (Goh 2000:56-57). L1 students can chunk up to 16 words per meaningful stream of speech into these units (Baddeley 2000:419). The units are then matched with background information at the utilization stage and their meaning is derived (Goh 2000:56-57).

Jung (2003:563), on the other hand, describes the listening process in terms of top-down or bottom-up processing. Field (2004:363-364) explains bottom-up processing as getting information from perceptual sources such as phonemes, as has been described earlier.

He describes top-down processing as the ability to derive meaning either from knowledge of the listening text or from background knowledge.

Top-down refers to the processing by listeners of real world knowledge in schemata in LTM. A schema is a data structure stored in LTM. Schemata can be either formal or content in form: formal refers to background knowledge about the discourse structure of a lecture ; content refers to background knowledge about the content of a lecture. These schemata are important to L2 students because they need to learn how to listen to lectures in order to listen to learn (Murphy 1996:109). Consequently, they need to comprehend discourse structure and content. According to Ryan (2001:290-291), listening to learn from lectures requires students to:

1. listen for the critical ideas in a lecture: *hippos eat grass.*
2. build internal connections among these ideas: *hippos have specially shaped mouths for grazing with.*
3. link the internal connections to external connections or background knowledge: *cows too have mouths specially shaped for eating grass.*

As a result of its complexity, learning from lectures is challenging for L2 students.

2.1.3 L2 Students' Listening Problems

The difference between L1 and L2 listening is that mental resources used by native speakers to interpret aural input are required by L2 listeners to decode language syntax and vocabulary (Meskill 1996:183).

According to Goh (2000), the three stages of listening (perception, parsing, and utilisation) are 'recursive' and can overlap (Goh 2000:57). These can overload L2 students' short-term memory capacity and disadvantage them in lectures (Goh 2000:67). For example, if words heard are not matched quickly to external connections and stored in LTM, the listening process can become gridlocked (Vandergrift 1999:169). Conversely, effective listening comprehension can free up STM to accommodate new informational units. One benefit of efficient listening to affective learning is the potential decrease in anxiety among L2 students during listening (Vandergrift 1999:169). L2 students do, however, experience problems with comprehension at the perception, parsing and utilisation stages of listening.

Problems at the perception stage can include the non-recognition of familiar words. In this case, students may not match sounds automatically to words because they have not stored the sounds of words efficiently in LTM. For example, if L2 students focus on word spellings to the neglect of sounds, they can generate inaccurate phonological representations of words in LTM. Therefore, for example, if the word *HOStel* is stored by a student as '*hosTEL*', it can make its retrieval from LTM difficult because the stress is on the wrong syllable. Consequently, LTM will not recognize it during listening (Goh 2000:61-62). Linguistically weaker L2 students tend to comprehend every word of listening input. As they focus on meaning at a word level, they use up short-term memory resources that could be used to derive higher-level meaning (Field 2004:365).

L2 students who are experiencing problems at the perceptual processing stage can compensate by using contextual clues from background knowledge to process input in a top down fashion. Importantly, the relationship between bottom-up and top-down processing is a variable one and changes as the amount of listener confidence in the reliability of each processing type fluctuates (Field 2004:367).

In addition to sounds, if word meanings are not fully automatic, word recognition and retrieval can be slow (Goh 2000:61-62). As a result, subsequent listening input can be ignored as L2 listeners become fixated and continue to think about the meaning of a word in present input. Again L2 students' potentially limited STM capacity can compound listening problems (Goh 2000:63).

At the parsing stage, students can quickly forget what is heard. Here students understand the gist or general meaning, but not the exact meaning. This is because they cannot remember key words and phrases. L2 students may need to form mental representations of words heard to remember information in detail (Goh 2000:64). One very important question arising from Goh's (2000) research is: How can parsing be taught to L2 students so that their academic listening skills can be improved? According to Goh(2000:71), L2 students have to retain as much spoken text as possible in short-term memory so that it can be processed before subsequent listening input is heard. Therefore, it can be difficult to teach parsing. In addition, little is known about how L2 students form mental representations of words in informational units or what causes parsing to fail.

At the utilization stage, L2 students can understand words but not the intended message. This is because they cannot connect words to external sources such as background knowledge or knowledge of discourse structure. For example, if students lack background knowledge about a topic such as American business protocol, they may find it difficult to understand related information in listening input (Goh 2000:62-63). L2 listeners may also experience the following problems at a higher level of information processing:

- they miss the beginnings of lectures and global lecture messages elude them;
- they cannot chunk words heard into informational units: the corollary being that they cannot distinguish changes of emphasis of ideas;
- they concentrate too hard or they are unable to concentrate (Goh 2000:64-65);
- they cannot listen selectively to lectures because they do not have a clear and planned purpose for listening (Goh 2000:66). As a result, they may not recognize discourse markers that signal important lecture information.

2.1.4 Metacognition

Many of the problems identified in Goh's (1998) literature are related to aspects of metacognition. Metacognitive knowledge empowers L2 students by making them aware of what they do not know (Klin et al. 1997:1378). It comprises both problem-solving processes and self-regulatory processes.

Problem-solving processes are called upon when tasks are non-automatic and new. One example of such a task might be solving a mathematical problem (Singer & Bashir 1999:265-266). Problem-solving has its roots in Vygotsky's concept of compensation which refers to how students can generate coping strategies to compensate for deficits in cognition (Meltzer 1993: 127-128). L2 students can compensate for listening problems by using strategies to follow lectures and to self-regulate learning. Self-regulation involves using a combination of cognitive, metacognitive, and affective strategies to generate learning. Important to self-regulation is the ability to not only use strategies, but also to be metacognitively aware of when and where to use them. Therefore, self-regulating students can plan, monitor, and evaluate their learning (Chamot et al. 1999:159-161). For example, students can self-question whilst monitoring their level of lecture comprehension (Kiewra 2002:77). Following Teong (2003:55), L2 students need to know when and how to use metacognitive strategies and what to do and when to do it when employing cognitive strategies.

2.1.5 Listening strategies

Goh (1998) investigated listening strategy use among L2 students by employing verbal protocol analysis. She asked two research questions: 1. What listening comprehension strategies do L2 listeners use? 2. Are there any similarities in the use of these strategies and tactics among L2 listeners of differing listening abilities? Her findings showed that L2 students do use listening strategies. She also found that high-ability students use more listening strategies than low-ability students.

She concluded that emphasis in strategy training should be on metacognitive strategies because students who are metacognitively aware are better at transferring strategies to novel listening contexts (Goh 1998:142-144).

L2 listeners can employ cognitive and metacognitive strategies to better understand lectures. At a cognitive level of strategy, students engage directly with words heard to make meaning. At a metacognitive level, L2 listeners plan, monitor and evaluate the listening process rather than deal directly with the listening input (Goh 1998: 125-126). According to Goh (1998), listening strategies comprise tactics. Tactics are what listeners do when they use strategies. Appendix J contains tactics that have been adapted from Goh (2000) for the analysis of verbal protocols in this study.

Goh (2002) revisited her previous (1998) research on strategy and tactics use among a group of L2 students. This time she created an inventory of tactics to improve the teaching of listening comprehension. Goh (2002) listed the following strategies and tactics which have been adapted by the researcher to highlight their relevance to lecture comprehension. *Inferencing*: students can use the following tactics to guess words:

guessing a word's meaning within an informational unit;
making external connections using background knowledge;
using visual cues.

Elaboration: listeners can embellish an interpretation to make it more meaningful and more complete by making external connections and/or using knowledge about academic English language structure and content.

Contextualisation: listeners can relate new information to background knowledge by employing the following tactics:

matching new information to background knowledge.

Translation : students can translate words or chunks of meaning into their L1 or native language.

Fixation: listeners can focus attention on comprehending a small part of the text by using the following tactics:

thinking about the spelling of unfamiliar words;

thinking about the meaning of words or informational units;

noting the sounds of unfamiliar words for clarification post lecture.

Visualization : students can form a mental picture of what is heard by: imagining scenes, events, objects and so on being described and forming a visual representation of the shape (spelling) of key words.

Reconstruction :students can build meaning from keywords heard and noted (Goh 2002:192).

Metacognitive strategies such as the following can be self-regulating:

selective attention: listening for important lecture information and frame markers;

directed attention: tuning out distractions during a lecture;

or they can generate reflection on the listening process such as:

comprehension evaluation: thinking about how much lecture information has been understood (Goh 1998:136-137).

The following metacognitive strategies and tactics have been adapted from Goh (2002:196-197) for the purposes of this study.

Selective attention: students can pay attention to specific parts of the lecture by using the following tactics:

listening for informational units;

listening for gist or general meaning ;

listening for familiar content words and signaling words;

listening for frame markers; paying attention to repetitions;

paying attention to intonation features.

Directed attention: students can monitor their attention and avert distractions by concentrating hard and/or by persevering with the listening process in spite of comprehension difficulties.

Comprehension monitoring: listeners can check and/or confirm on-going comprehension of the lecture by employing the following tactics: confirming understanding of lecture content;

noting ideas or words that were not understood;

situating a present understanding of words heard into the context of the message so far;

matching present understanding against background knowledge of the topic.

Real-time assessment of input: listeners judge whether parts of the lecture are important or less important to understanding the topic

Comprehension evaluation: students can judge the accuracy of what they have heard by employing the following tactics:

checking completeness of understanding of the lecture with LLP;

checking understanding against background knowledge;

matching their interpretations within the context of the complete lecture (Goh 2002:196-197).

2.2 Cognitive Load Theory

Cognitive load theory (CLT) considers the effect of information structure or how information is presented on 'cognitive architecture' with a special focus on working memory so that it can provide a blueprint for research into cognitive processes and instructional design (Paas et al. 2003:1).

According to CLT, information received by students can range from low to high along a continuum on which reside a range from low to high of elemental interactivity. In low-elemental interactivity, each element in listening input can be understood and learned without having to understand the other items (Pass et al. 2003:1). An example might be recognising a word from a list of words read aloud. Conversely, in high-elemental interactivity, the total message cannot be understood until all elements and their interactions have been processed at the same time. As a result, listening input containing high-elemental interactivity is challenging for L2 students to comprehend (Pass et al. 2003:1). One example of high- elemental interactivity in an L2 language teaching context would be words interacting syntactically in a lecture informational unit that cannot be understood until all the words are heard and processed together.

There are three types of cognitive load: intrinsic or essential ; extraneous and germane or effective. Intrinsic cognitive load is so called because the effect that elemental interactivity has on working memory is essential to the learning context. Elemental interactivity is linked to task difficulty; for example, spelling lists would have low elemental interactivity and lectures would have high elemental interactivity. In other words, levels of elemental interactivity affect intrinsic cognitive load by increasing or decreasing the complexity of learning materials (Pass et al. 2003:1). In an L2 listening context, Anderson and Lynch (1998:55) describe how an information-driven lecture can be challenging for students because it contains many elements.

Extraneous cognitive load comprises unnecessary load in the form of information presentation and learning tasks. For example, if L2 students are required to listen to a lecture, watch a Powerpoint display, and take notes, they effectively have to listen, read, write and organise their notes. These activities impose a heavy load on working memory resources that weaken their ability to facilitate comprehension, schema acquisition and automaticity (Paas et al. 2003:2).

When intrinsic cognitive load is high in elemental interactivity and is combined with extraneous cognitive load, information presentation and learning activities may impede learning for L2 students. To reduce cognitive load, instructional designs can simplify learning tasks (Paas et al. 2003:2).

For example, if L2 students have a framework to complete when taking lecture notes, they may not have to think about how to organise their notes and consequently, they can concentrate more fully on listening comprehension. On the other hand, it could engender incidental processing and increase task difficulty (Mayer and Moreno 2003:45), if it requires students to think about where within the framework to record information.

According to cognitive load theory, learning materials should be designed so that extraneous cognitive load is eliminated (Kalyuga et al. 1999:367). When students take notes within a framework for example, it may ease cognitive load for those students thus constituting a germane cognitive load. Therefore, in an instructional context where extraneous cognitive load impedes learning, germane cognitive load can enhance it. More specifically, if extraneous load results in learners having to engage in incidental processing, germane cognitive load can support working memory resources that are used to perform essential processing. Affective factors such as increases in motivation and effort that generate schema acquisition and automaticity also constitute germane cognitive load (Paas et al. 2003:2).

Mayer and Moreno (2003:45) describe cognitive overload as any learning task that surpasses the working memory resources whilst processing information. Dual Processing Theory as applied to practice could support listening comprehension and generate germane cognitive load for L2 students. This in turn could counteract the effects of cognitive overload.

2.2.1 Dual Processing Theory

Dual Processing Theory states that words in written text may first be organized in the visuo-spatial sketchpad before being translated into sounds in the phonological loop or auditory memory (Mayer & Moreno 1998:312). Dual Processing Theory assumes the following:

1. working memory comprises an auditory working memory and a visual working memory known respectively as the phonological loop and the visuo-spatial sketchpad;
2. working memory is limited in capacity;
3. in accordance with Mayer's (1997) generative theory of multimedia learning, learning happens when a student:
   a) retains information in each memory store;
   b) organizes the information in each store;
   c) and finally makes connections between the organized information in each store;
4. instructional materials should conform to Paivio's (1986) Dual-Coding Theory which states that corresponding visual and auditory information must be in working memory at the same time (Moreno & Mayer 2002:157).

According to Dual Processing Theory, visual information is processed first in visual working memory while auditory information is processed in auditory memory. Thus, when students read text with concurrent narration, the information contained therein is represented in both memory stores.

As these stores are independent of each other, short-term memory resources are increased (Moreno & Mayer 2002:162). Therefore, students can hold representations in each memory store simultaneously and construct referential links between them by integrating the representations before building a coherent verbal representation. Thus, the information is redundant (Moreno & Mayer 2002:157).

Moreno and Mayer (2002:156) define verbal redundancy, a subset of redundancy, as 'the simultaneous presentation of text and narration with identical words'. Penney (1989), as cited in Moreno and Mayer (2002:156), reported that words presented in two modalities (visual and auditory) generated greater memory recall than words presented in one modality. Lewandowski and Kobus (1993) found that participants in a redundant condition, where words were presented in two modalities, retained more words (Moreno and Mayer 2002:156).

The quantity of information that can be processed in either the auditory or the visual modality may exceed the processing capacity of either one (Kalyuga et al. 1999:353). However, using more than one modality may expand limited working memory resources. Mosavi, Low and Sweller (1995) reported that using more than one modality increased working memory resources and positively affected learning (Kalyuga et al. 1999:353).

Tindall-Ford, Chandler and Sweller (1997) found that engineering instructions presented in an audio-text/visual diagram format were superior to solely visually based instructions (Kalyuga et al. 1999:353). Jeung, Chandler and Sweller (1997) showed that audio-visual presentations which increased working memory capacity improved learning if students did not have to do a visual search. In visual search, mental resources are used to coordinate auditory and visual information (Kalyuga et al. 1999:353). In addition to visual search, representational holding describes a case of cognitive overload when either verbal or visual information has to be held in its respective modality in working memory while its complimentary modality makes a late asynchronous appearance (Mayer and Moreno 2003:45). For example, if sounds and images are not synchronised, one modality has to hold an item until its complimentary visual or auditory stimulus appears.

In contrast to Moreno and Mayer (2002), Kalyuga et al. (1999) employed the term verbal redundancy to describe learning situations in which simultaneous verbal and visual information had a negative impact on learning. For example, Kalyuga et al. (1999) found that computer-based learning materials comprising diagrams and auditory narration are more effective at promoting learning than materials consisting of diagrams and redundant auditory narration and on-screen text. In the latter case, according to cognitive load theory, learners needed to split their attention between text and diagrams thus overloading their working-memory capacity (Moreno & Mayer 2002:157).

According to Kalyuga et al. (1999:369), multiple sources of information may cause cognitive load that in turn results in the using up of working memory resources that are normally reserved for schema acquisition.

Split attention is present when multiple sources of information challenge students' understanding of learning materials. As the materials need to be mentally integrated to be understood students should not have to search for suitable matches to mentally integrate information (Kalyuga et al. 1999:367-368). If there is no search, cognitive load is reduced and the acquisition of schemata is supported (Kalyuga et al. 1999:368).

Schooler and Engstler-Schooler (1990) as cited in Kalyuga et al. (1999), found that verbalizing a visual stimulus by describing facial features of people viewed on video hindered later recognition performance. Verbalising was redundant and presented an extraneous cognitive load that impacted negatively on learning (Kalyuga et al. 1999:362). Kalyuga et al.(1999), found that the weakest instructional procedure of three experimental procedures was the simultaneously delivered visual and audio text (1999:362). This latter finding is important because according to Kalyuga (1999:362) it is widely believed among multimedia designers and educational software manufacturers that duplicating identical audio and visual text in learning materials promotes learning.

However, in opposition to Kalyuga et al. (1999), Moreno and Mayer (2002) found that verbal redundancy had a positive effect on learning.

Their study found that more learning was generated when words were presented visually and aurally rather than in one modality, when there were no concurrent diagrams or pictures to cause split-attention (2002:157). Moreno and Mayer (2002:157) looked at the effect on understanding of on-screen text when it was added to a narrated scientific explanation. They compared the learning outcomes of four groups. Moreno and Mayer (2002) designed their experiment so as to control for the effects of split attention by preceding the presentation with animation for two groups and found that redundancy in verbal messages enhanced learning. According to Dual Processing Theory, corresponding text and narration can be processed initially in visual and auditory working memories. As both memories are independent of each other, students can hold information in them and build referential interconnections between them. Thus when auditory information and on-screen text are processed simultaneously, students build coherency by integrating visual and auditory information. Moreno and Mayer's (2002:157) Dual Processing Theory of multimedia learning predicted enhanced learning from redundant information. Kalyuga et al's. (1999) study, on the other hand, involved the simultaneous presentation of corresponding auditory and visual text with graphics forcing students to split their attention between modes (Moreno & Mayer 2002:159). Therefore, by removing the simultaneous graphics display, split attention is eliminated.

According to Meskill (1996:183-184), the building of 'mental representations' is essential to the listening process and L2 students need support to construct them. As a result, any listening input from lectures that is supported by visuals can decrease the quantity of short-term memory resources needed for linguistic decoding. This is because visuals can potentially facilitate the freeing up of those resources so that processing at the utilisation stage of comprehension can take place.

2.2.2 Multimedia in Language Learning

The language laboratory is an example of a technology that was employed widely to teach L2 listening The premise underlying the development of this uniquely audio-based technology was that L2 students could enhance their listening skills by practising listening to audio-tapes. In this way, it was thought that L2 students could achieve a measure of independence. Nowadays computers are considered capable of supporting L2 students' listening comprehension and there is growing support for Computer Assisted Language Learning (CALL). Computers present an opportunity for language learners to process text, sound, and video. There is an expectation that computers will be more successful at enhancing L2 listening skills than the once popular language laboratory (Meskill 1996:181).

While a plethora of research has been done into computer assisted learning (CAL) and its effect in an academic context (Ryba 1989, Ryba 1991, Lai 1993, Selby & Ryba 1994, Ryba et al. 1995, Collins & Lai 1996, Lai 1997, Lai 2004, Kennedy & Cutts 2005, Lai 2005, Bain & McNaught 2006, Draper & Brown 2004, Ellis et al. 2006, Kennedy & Cutts 2005, Littleton et al. 2006, Oliver 2006, Scanlon & Issroff 2006), little published research has been done into CALL (Adair-Hauck et al. 1999:270).

Published CALL research focussed on the following: feedback (Brandl 1995, Nagata 1993, Nagata & Swisher 1995, Robinson 1989, 1991); pronunciation and intonation training (Stenson et al. 1992); interactive reading (Svenconis & Kerst 1995); computer-facilitated student interaction and talk (Beauvois 1992, Chun 1994, Cononelos & Olivia 1993, Meunier 1994); and writing (Armstrong & Yetter-Vassot 1994, Barnett 1989, Greenia 1992). In addition to the above, Johnson (1985) investigated CALL in relation to L2 language learning. However, she focused solely on 'equal access, software development, computers in composition, typical practices, and model programs' neglected to address the integration of CALL into a language curriculum (Adair-Hauck et al. 1999:270).

There is also little empirical research on the effectiveness of CALL. However, one study by Raschio (1990) investigated the effect of learning styles and CALL on achievement by comparing CALL with traditional language learning materials. He found no significant relationship between those variables.

Raschio called for research to be done on the learning process as related to CALL as well as on product or learning outcome (Adair-Hauck et al.1999:270). Johnston (1992) described one teaching method that took a stimulus-response approach to language learning and supported the teaching of discrete-item grammatical forms. Students would insert a missing cloze item into decontextualised sentences: sentences not linked meaningfully in the way, for example, a paragraph should be. The computer would alert students immediately as to whether they were correct or not (Adair-Hauck et al. 1999:271).

To sum up, previous studies on CALL covered areas such as pronunciation, student talk, reading and writing, but there have been no systematic studies of academic listening and notetaking. The present study goes beyond the published research by examining academic listening and notetaking. In view of this, it was deemed essential to review literature specifically concerned with that topic rather than reviewing research on the general effects of CALL on second language learning. Therefore, a review of the general effects of technology was considered not to be as relevant as a review of the literature on academic listening and notetaking because such a discussion would fail to adequately inform the specific focus of the present study .

With advances made in multimedia, CALL has evolved into TELL or technology-enhanced language learning. The simple 'add on component' type associated with CALL has progressed into an integrated system of multimedia technologies. Multimedia is a combination of technologies such as audio, video, computer text, graphics, and animation (Chuang 1998:2). It can facilitate the integration of the four skills of speaking, listening, reading, and writing in a contextualised and meaningful way. In this way, multimedia has the potential to be more effective than discrete-item type cloze tasks because in those tasks, students can only read. The other three language skills are not employed (Adair-Hauck et al. 1999:271). A major challenge that presents itself for language teachers is the effective integration of multimedia technology into L2 classrooms. To achieve this, technology in education has to successfully deliver educational objectives that support the language needs of L2 students (Meskill 1996:179-180).

This section deals with multimedia research that is relevant to this investigation. The present study is underpinned by Mayer's (1997, 2001) generative theory of multimedia learning as influenced by Paivio's (1971,1986) Dual Coding Theory. Mayer's theory states that for comprehension of a text to occur, students need to select necessary verbal and visual information from a text, and organize them into coherent verbal mental representations. They can then construct referential links between the two representations thus integrating them with one another (Jones & Plass 2002:548).

For example, there is strong evidence that subtitled video which integrates images, sound and text can enhance listening comprehension (Meskill 1996:184). In this way, the subtitles can signal direction for the listener and can 'scaffold meaning' and as a result, they decrease the amount of linguistic decoding necessary for comprehension. Plass et al. (1998) investigated the effects of annotations on comprehension and vocabulary acquisition from a German reading text. They found that learning occurs when students can choose pictorial and written information, organize the information in working memory, construct referential links between pictorial and written information, and integrate them with background knowledge (Jones & Plass 2002: 548).

Chun and Plass (1996a, 1996b) in Jones & Plass (2002:548) looked at the effect on L2 reading of annotations with different media on vocabulary acquisition and comprehension. They reported that pictorial and written information helped L2 students to process computer-based reading activities. The learners could hold verbal and visual representations in working memory at the same time when written and pictorial information was presented simultaneously. This permitted students to construct referential links between the verbal and visual representations. This resulted in better recall for vocabulary and information (Jones & Plass 2002:548). Research outside of multimedia has shown that pictorial or written information that plays a supporting role in the comprehension of an aural text can enhance listening comprehension performance (Jones & Plass 2002:548).

In a study by Severin (1967) cited in Jones and Plass (2002:548-549), students who listened to a passage with pictures did better on post-listening activities than students in a sound or in an unrelated pictures category. Mueller (1980) reported that sound alone is sufficient for comprehension in high background knowledge students, but that dually-coded information may be necessary for low background knowledge students. Chung (1994) looked at the use of video and images to promote listening comprehension. He found that listening support as provided by video or a single picture generated a greater increase on comprehension than multiple pictures or no video (Jones & Plass 2002:548-549).

In research investigating the effect of subtitles on listening, Danan (1992) found that when video input was combined with reversed bimodal verbal input (subtitles in a foreign language and audio in a listener's native language), it supported the learning of vocabulary. Danan's (1992) finding was thought to support Paivio's Dual-Coding Theory in that students learned new words by linking a word in their native language with a corresponding action, and its translation in a target foreign language (Plass et al. 1998:26). In contrast however, Baltova (1999) investigated the effects of French audio with French subtitles (bimodal format) or English audio with French subtitles (reversed bimodal format) on the comprehension and vocabulary acquisition of L2 students. Baltova found that students learned significantly more vocabulary in the bimodal format (Jones & Plass 2002:550).

Extending previous research on subtitles, Guillory (1998) investigated the effects of keyword captions and she concluded that smaller amounts of text are less likely to overload processing resources and more likely to improve listening comprehension. This ties in with cognitive load theory in so far as video would cause viewers to split their attention between video, captions and sound; therefore, the less information there is to process the better.

In addition to increased comprehension, digital video gave students control of the learning situation to the extent that they could view/review the video, look up words, and interact with the language of the video. This created a 'collaborative ecology' that was 'conducive to learning' (Jones & Plass 2002:550).

Research into listening comprehension supported by technology has mainly concentrated on the enhancement of listening skills or on compensatory techniques to counteract a lack of listening skills. In the latter case, if an L2 student lacks background knowledge of a listening topic, he or she can still comprehend an aural text if they have the technological support with which to interact with that text both visually and aurally. The LLP System is an example of such a supportive technology and its employment in a lecture theatre is discussed in chapter three.

2.2.3 Liberated Learning

The Liberated Learning Project (LLP) is an applied research project which looks at two main questions: 1. Can continuous speech recognition (CSR) technology be successful at displaying speech-to-text in university classrooms to provide universal access to lecture material for students from diverse backgrounds? and, 2. Can CSR be a successful alternative to traditional styles of lecturing? (Bain et al. 2002:192). The LLP was devised and initiated by Saint Mary's University (Halifax, Canada) in 1998 in association with IBM. Subsequently, an international consortium was developed with the aim of further refining and researching the LLP (Bain et al. 2002:192).

Members of the consortium currently include: Alexander Graham Bell Institute; University College Cape Breton, Canada; Trent University, Canada; Cambrian College, Canada; Purdue University, USA; California State University Northridge, USA; Messiah College, USA; Massachusetts Institute of Technology, USA, University of the Sunshine Coast, Australia; Australian National University, Australia; Central TAFE College, Australia; Murdoch University, Australia; and, Massey University, New Zealand. Working in association with the University of the Sunshine Coast, Massey University is the first New Zealand tertiary education institution to
trial the LLP Technology in New Zealand.

The aim of the Liberated Learning concept is to provide universal access to lecture information for students from diverse backgrounds. It does this by incorporating CSR as a natural extension of the instructional process within the university classroom. An illustration of the LLP System and how it works in practice is displayed in Figure 1 below.

Early on, the Liberated Learning team realized that commercially available speech recognition software (*ViaVoice*™) was not conducive to use in the classroom environment. As such, IBM in collaboration with the Liberated Learning team created the first classroom speech recognition technology that would successfully digitise a spoken lecture and display output in readable form (*Viascribe*™). *Viascribe* software includes the need to use no punctuation; an algorithm utilizing naturally occurring pauses in speech causes the displayed text to move to a new line, creating automatic readability of text. After the lecture has been delivered, the lecture is edited, punctuation is inserted, recognition errors are corrected and redundancies removed. The software can synchronize text and speech data to create bi-modal multimedia lecture notes, accessible in multiple formats via the internet: text, audio, or synchronous text and audio transcriptions.

After training in the use of automated speech recognition software (voice-to-text) (IBM's ViaVoice and Viascribe), faculty members, wearing cordless microphones use CSR in their lecture theatres (see figure 1).

Their spoken lectures are digitised and simultaneously translated into text using the Viascribe software, then displayed on a large screen in front of the lecture theatre so students can both see and hear the lecture. (Paez 2002: 920).

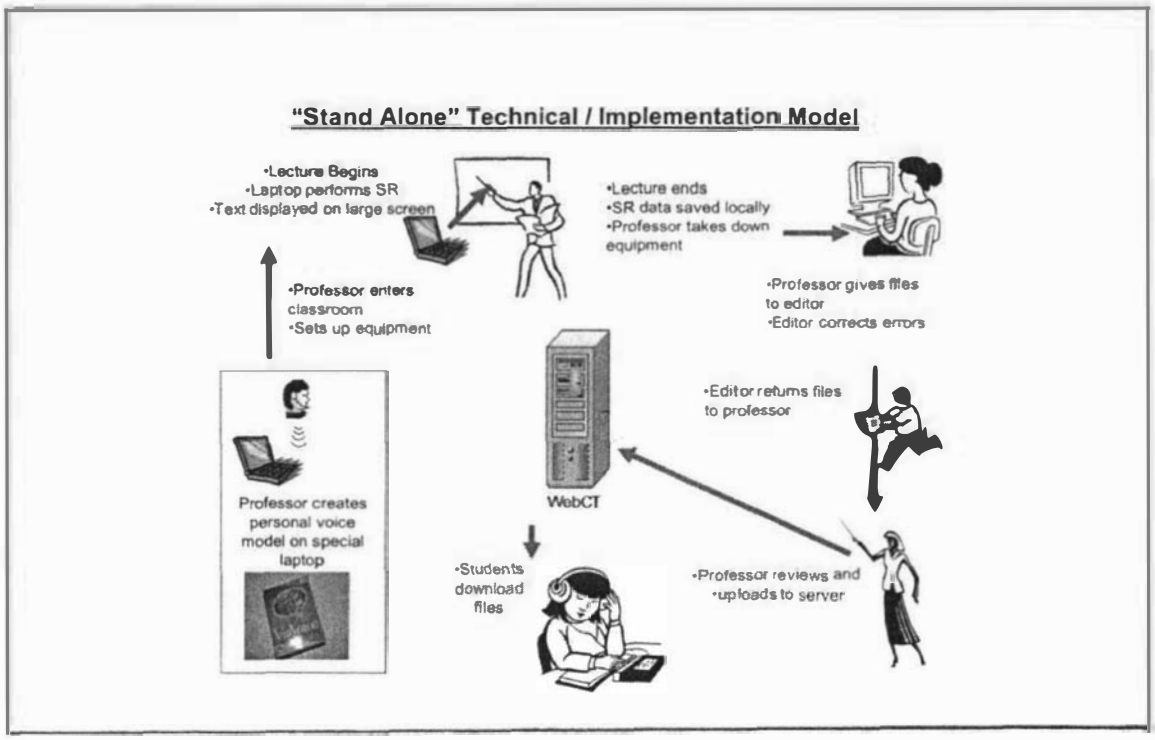

Figure 1: Stand-alone Liberated Learning System

The text is simultaneously displayed via projector in real time and students can simultaneously hear and see the lecture as it is delivered. In this way, it can reduce cognitive load for students by increasing short-term memory resources. Therefore, it is reasonable to assume that the LLP System can potentially benefit all students, especially those with special learning needs.

This includes students who:

- are deaf or hard of hearing;
- have medical health and physical conditions that prevent their full participation in lectures;
- have learning difficulties;
- use CSR as a reference check for their notes.

LLP also aims to provide students from non-English speaking backgrounds with a tool to give them greater access to lectures, thereby "liberating" their learning options (Leitch & MacMillan, 2001). CSR technology provides a real-time digital display of spoken lectures/lessons and from this, on-line transcripts of those lectures/lessons. The on-line transcripts then become available for students to use through access to *WebC*™. A finding in Heller (2004:17) is that 65% of students who have access to Liberated Learning use these on-line transcripts. Thus the aim of liberated learning is to further CSR supported lecture comprehension among students with disabilities and among L2 students in the lecture theatre (Leitch & MacMillan 2003:9).

Listening to academic lectures can be challenging for many L2 students and they often fail to understand the main points of lectures (Jung 2003:562). One reason for this failure is that lectures impose a heavy cognitive load on L2 students in terms of auditory processing (Thompson 2003:5).

Therefore, additional processing support in the form of simultaneous visual text may give L2 students a support system with which to compensate for any deficiencies in listening comprehension (Leitch & MacMillan 2003:10). Liberated Learning can provide listening support through scaffolded instruction utilising synchronous text displays and asynchronous online streaming of spoken lecture speech. To this end, findings by Leitch and MacMillan (2003) report the following positive uses of the Liberated Learning speech display:

1. compensating for lecture information that was missed;
2. comparing on-screen text to the spoken language of the lecture;
3. supporting students with the pace of the lecture (Wilkes et al. 2003:8).

According to Paez et al. (2004:218), LLP Technology can reduce cognitive load in L2 students by 1. providing visual support with which to cope with lecture delivery rate, 2. providing opportunities to match the spoken word with its written equivalent, 3. supporting students' abilities to track lectures in terms of their meanings and arguments, and 4. supporting students' notetaking.

LLP is in its infancy and there are three very important challenges for LLP to meet before it can become a successful alternative to traditional methods of lecturing. It needs to:

1. perfect the accuracy of the electronic text;
2. generate an increase in quality and quantity of notetaking;
3. improve the readability of displayed text (Bain et al. 2002:194).

2.3 Lectures

According to MacDonald et al. (2000:255), at a macro-level, lectures comprise three elements: field, mode and tenor. Field refers to the subject matter and purpose of the lecture such as a lecture on information systems. Tenor describes the nature of the interaction between speaker and audience. Mode is the rhetorical organization of the lecture (MacDonald et al. 2000:259).

Tenor is the quality of the interaction between lecturer and student. For example, lecturers can check L2 students' understanding (Flowerdew and Miller 1997:43). Lecturers can also encourage affective strategies such as sharing of information in groups (Miller 2002:158) to make the listening process less threatening (Flowerdew & Miller 1996:136). In this regard, Lebauer (1984:43) describes how psychological problems among L2 students that result from previous bad experiences during listening practice can lead to a fear of not recognizing every word heard.

Thompson (2003:5) warns that when L2 academic listening textbook lectures ignore the tenor aspect inherent in authentic lectures, they may disadvantage students. For example, in authentic lectures, lecturers may interact constantly with the audience possibly with the help of visual aids (MacDonald 2000:261). Therefore, if students have no experience of interactive lectures, they could be disadvantaged in an authentic lecture context.

2.3.1 Lecture Mode

2.3.2 A comparison of authentic lectures and L2 academic listening textbook lectures

Following criteria in Flowerdew and Miller (1997: 30-41) as adapted by Balizet (2001), a ten point contrastive analysis of authentic lectures and textbook or scripted lectures is presented below to highlight inadequacies in EAP listening textbooks. Authentic lectures and textbook lectures are compared as follows:

1) authentic lectures are not coherent while textbook lectures are coherent because they contain written language.
2) authentic lectures are structured by tone groups in incomplete clauses and are signalled by pauses or by *and, so, but, now, okay*. Textbook lectures are divided into complete clauses and sentences by punctuation. Structuring is signalled by written linking words such as *because, after all, however*.
3) Authentic lectures contain the following examples of natural speech (Rubin 1994:203):
   a) false starts are common in authentic lectures while they do not exist in scripted textbook lectures e.g. *I want to er... I need to say* ;
   b) hesitations are also common in authentic lectures, but are absent from textbook lectures e.g. *I want to ...I want to say;*
   c) redundancies such as repetition are caused by real-time processing and allow learners to have more time for comprehension e.g. *I want to talk about these numbers here.....these figures are important to the topic;*

4) discourse markers are used in authentic lectures to signal what has been/will be presented. They signal the topic of the lecture . In textbook lectures, they are over-used in an unnatural fashion in short lectures;
5) rhetorical questions are used in authentic lectures to introduce a new topic or to build a rapport with the audience. In textbook lectures, they are redundant;
6) in authentic lectures, lecturers empathise with students and personalise with examples while in textbook lectures, this aspect is missing;
7) an authentic verbal-visual presentation can make notetaking difficult. In textbook lectures, visuals appear as charts or graphs to be filled in as follow-up work;
8) authentic lectures last 45 minutes while textbook lectures last 2-12 minutes;
9) authentic lectures contain 7,000+ words while textbook lectures contain 300-1,500 words;
10) body and facial language or paralinguistic features are an important part of the whole communicative message in authentic lectures. However body and facial language cannot be reproduced on audiotape in commercially produced materials.

2.3.2 Discourse markers

The comprehension of high-level discourse markers which signal a change of topic or an emphatic point has a positive effect on recall (MacDonald et al. 2000:257). According to Lehrer (1994), the presence or absence of discourse markers can have diverse effects on lecture comprehension in lectures delivered in different lecturing styles (MacDonald et al. 2000:257). Discourse markers can be macro or micro in function. Macro-markers introduce the macro-structure of a lecture by highlighting the most important information in a lecture and by sequencing that information. Micro-markers highlight links between informational units in lectures (Rubin 1994:204). Flowerdew and Tauroza (1995) found that the presence or absence of low-level discourse markers such as *well, now, OK* that mark relationships between chunks of discourse affected comprehension (MacDonald et al. 2000:257).

According to MacDonald et al. (2000), L2 students need signals to recognize the structure of lectures (2000:256) because topic, sentence, and phrase boundaries that are common in written text are hidden in speech. Pausing, pitch, and speaking rate variation can replace written language (Shriberg et al. 2000:128-129). For example, lecturers speak in propositions or informational units, not sentences, and lecture information is segmented (McCarthy 1991:99) into what Baddeley (2000:419) calls 'idea units' or propositions.

A proposition or informational unit is the smallest unit of meaning that underpins the surface structure of a text (Coderre et al. 2003:697). As full stops define sentence boundaries, pauses fulfil the same function for informational units (McCarthy 1991:101).

According to Jung (2003:562), a large body of research has shown that L2 students' comprehension difficulties in lectures are due to both an inability to use discourse markers to follow the organization of lectures and to understand informational units. Clerehan (1995:148) states that when L2 students could not understand the structure of a lecture, they could neither differentiate between major and minor ideas nor recognize interconnections between ideas.

Hron et al. (1985) extended research on reading discourse markers to L1 listening comprehension. They found that listeners who listened to text containing discourse markers recalled more ideas and performed better in tests containing open-ended questions (Jung 2003:563). Rickards et al. (1997:515) confirmed Hron et al's (1985) findings when they found that discourse markers helped students to take more notes both overall and on main ideas. Discourse markers also supported recall of both important and general information.

Research on the effect of discourse markers on L2 listening has brought mixed results however. For example, Chaudron and Richards (1986) as cited in Clerehan (1995), categorized discourse markers into macro- and micro-markers. They described macro-markers as cues that signal connections between main parts of a lecture and map the important transition points in lecture discourse (e.g. What I'm going to talk about today is ....). They categorised micro-markers as signals that highlight relationships between information or that function as fillers such as *and, so, and well.*

Chaudron and Richards (1986) then studied the effect of discourse markers on L2 lecture listening and understanding. They used a videotaped lecture and composed four versions of the same lecture. The first was a no discourse marker version. The second was a micro-discourse marker version with markers such as "well" and "then" that signal interrelationships between idea units. The third was a macro-discourse marker version with markers signaling the direction of the lecture such as "to begin with..." The fourth was a version containing both macro and micro-markers. They found that the best recall was for version three above. The macro-markers highlighted the significance and the sequencing of high-level information that generated greater recall amongst the L2 students (Clerehan 1995:147). They also found that while macro-markers aided lecture comprehension in L2 students, micro-markers showed no benefits for comprehension.

In addition, they found that macro-markers improved comprehension better than a combination of macro-and micro-markers (Jung 2003:563-564). Flowerdew and Tauroza (1995) criticized the unnatural lecture materials used in Chaudron and Richard's (1986) investigation because the researchers artificially inserted micro-markers into written lecture text (Jung 2003:564). Thus, they created an unnatural hybrid and compromised text authenticity.

DeCarrico and Nattinger (1988:98) also criticized Chaudron and Richard's study (1986) for employing length to differentiate between micro-and macro markers rather than their function within the lecture. Accordingly, DeCarrico and Nattinger (1988:98) maintained that Chaudron and Richard's results should be treated with caution. A further criticism of the Chaudron and Richard (1986) study was that they required listeners to stop and complete tasks thus interrupting their listening and consequently affecting comprehension. This compromised the 'ecological validity of the task' (Jung 2003:564). In other words, the requirements of the task did not replicate what students actually do when they listen to lectures and take notes.

Dunkel and Davis (1994) reported similar findings to Chaudron and Richards (1986), but according to Jung (2003:564) their research was criticized for four main reasons. Firstly, they failed to examine the level of comprehension that was understood. Secondly, they used scripted lectures and thirdly, they did not control for background knowledge.

Finally, they neglected to take language proficiency into account to make sure that the control and experimental groups were homogeneous. In addition, Dunkel and Davis (1994) may have used simple texts, thus negating the need for listeners to listen for discourse markers (Lynch 1998:9).

Flowerdew and Tauroza (1995) researched the effects on listening comprehension of micro-markers as defined by Chaudron and Richards (1986). In contrast to Chaudron and Richards (1986), they found that students who listened to a lecture containing micro-markers comprehended more than students who listened to a lecture without micro-markers. They showed that micro-markers help students to understand lectures. However, like Dunkel and Davis (1994) they did not control for listening proficiency (Jung 2003:564). On the other hand, Flowerdew and Tauroza (1995) used a naturally delivered lecture and controlled for background knowledge: two factors that affect the comprehension of spoken text (Jung 2003:565).

Jung (1999) looked at the effects of both macro and micro-markers on L2 listening comprehension. She found that a signalled group who listened to a lecture containing discourse markers recalled more high-level information (main ideas and topics) and low-level information (ideas that exemplify and support the main ideas). The signalled group scored higher in listening comprehension than a nonsignaled group. In addition, in contrast to the signalled group, the nonsignaled group misunderstood the main ideas of the lecture and became confused about the main points of the lecture topic.

Furthermore, the signalled group recognised more details in the lecture information (Jung 2003:564).

Finally, Jung (2003:569) found that the signalled group had much greater and much more accurate recall of both high and low-level information, thus extending previous research reporting the benefits for students of using discourse markers. As a result, Jung (2003) is at variance with the earlier research of Chaudron and Richards (1986) and Dunkel and Davis (1994). These latter researchers found no significant evidence for the beneficial effects of markers overall. Jung (2003) used an authentic lecture and controlled for both language proficiency and background knowledge. This may explain why her results are at variance with certain previous research.

Lecture topics are signalled by changes in intonation and by discourse markers (McCarthy 1991:132). For example, Thompson (2003:8) describes topic change as a gradual lowering of pitch followed by a pause and a rising pitch again such as in *"ENded ...neXT OBESITY"*. Discourse markers also signal the boundaries of topics and sub-topics (McCarthy 1991:132). These examples from Thompson (2003) highlight the functions of discourse markers:

1. refer to the topic or sub-topic content;
2. make a transition statement: *next obesity* ;.
3. refer globally to the lecture or part thereof : *now the conclusion* ;
4. make an interpersonal reference: *we apply;*
5. refer to the speaker or audience :*I;*

6. make reference to the speaker's aims: *to consider*
7. operate as rhetorical questions which introduce a topic: *so what's the species that is most like us;*
8. operate as structuring markers which show the order of topics and sub-topics;

   The structure of this lecture is quite simple I'll take the terms one after the other I'll start with water .....and then I'll move on to farms;
9. operate as metastatements which refer to what the lecturer will do in the lecture:

   *right so let me start the lecture (*Thompson 2003:7-10).

If students learn to recognize these signals, they can gradually build up a picture of the hierarchical structure of lectures (Thompson 2003:6).

2.3.3 Cohesion in lectures

Murphy and Candlin (1979) in Lebauer (1984:45) analysed cohesive devices that relate informational units within the lecture to each other. They found the following devices in lecture text: reference, substitution, ellipsis, conjunctive elements and lexical cohesion. Lebauer (1984) does not elaborate on Murphy and Candlin's (1979) interpretation of reference; however, Flowerdew (2003) gives some insights.

According to Flowerdew, EAP students need to understand "signaling nouns" in lectures (Flowerdew 2003). A signaling noun is an abstract noun, such as, *issue, process, reason, difficulty, assistance, way.*

Because they do not have concrete meanings, they are cognitively complex and therefore difficult to teach. Signaling words are commonly used in academic language (Flowerdew 2003:331) to link lecture text at the level of informational units to make text coherent. They can be used cataphorically, anaphorically, and exophorically (Flowerdew 2003:338). The cataphoric function of the signaling word 'issue' for example, is as follows: 'there are quite a few issues that have to be addressed' refers forward to the discourse marker 'the first issue is now that…' and they are linked cohesively (Flowerdew 2003:330).

The following example of the anaphoric function of a signaling word is from Flowerdew's data (2003):

1. *Secretion is released from the free surface of the cells*
2. *Mucus is secreted this way. Way* in sentence 2. refers back to the process described in sentence 1.

When a signaling word is used exophorically, it appeals to background knowledge. This is knowledge that listeners need to have about the lecture topic (Flowerdew 2003:338). Flowerdew (2003:331) found only two academic listening textbooks that deal with signaling words and neither one deals with their cohesive function.

Other cohesive devices as described by Lebauer (1984) are as follows:

1. substitution. such as: *This is the text and it has course content; it* substitutes for the word *text;*
2. ellipsis such as:. *I'll move on to the next topic; I'll* is the shortened form of *I will;*
3. causative conjunctions such as: *so, therefore, then* can be used as concluding moves and alert the listener that what follows is important information;
4. adversative conjunctions such as: *yet, nevertheless* which contrast with preceding information with information that follows.

2.3.4 Lecture schematic structure

In addition to the above, listening to lectures can be challenging for overseas students because of the schematic structure of the lecture. For example, lectures can either be 'information driven' or 'point-driven'. 'Point-driven' lectures contain an argument structure. 'Information-driven' lectures contain facts. Facts are easier for L2 students to understand than arguments (Olsen & Huckin 1990:33). This is because L2 students may recognise the words, the informational units and frame markers of a lecture, but not its main points or logical argument. As a result, L2 students appear to need training in how to develop strategies to comprehend 'point-driven' lectures (Olsen and Huckin 1990:33).

2.3.5 Lecturing styles

According to Northcott (2001:21), lecturing styles can be of three types:

1. a reading style- the lecturer reads or speaks using notes;
2. a conversational style- the lecturer speaks using formal language with or without notes; and,
3. a rhetorical style- the lecturer uses a wide intonational range in a performance.

Brown and Manogue (2001) make much clearer distinctions between lecturing styles which they place on a continuum with 'reading aloud' types at one end and 'associating aloud' types at the other (2001:232).'Reading aloud' is narration where a written text is read to the students. The following is a list of categories of lecture style that appear on this continuum beginning with 'reading aloud':

1. oral presenters: they read scripts aloud;
2. visual information givers: they read scripts aloud and use visuals;
3. exemplary performers: they talk from notes and use visuals;
4. eclectic lecturers: they talk from notes and use visuals, but are less prepared than exemplary performers; and,
5. amorphous talkers-they are less prepared than eclectic lecturers and often digress from the topic. They are found at the 'associating aloud' end of the continuum.

According to Brown and Manogue (2001:232), exemplary performers are the most effective lecturers. However, Flowerdew and Miller (1996:126) warn that L2 students can be cognitively overloaded by having to read diagrams, listen to a lecture, and take notes.

L2 academic listening textbooks include lectures that contain written language to be read aloud. Miller found that when science written text was read aloud to L2 students, it decreased comprehension (2002:148) because of cognitive overload (Jung 2003:565). Written language is dense in propositional language that is difficult to process. In fact, L2 listening problems have been attributed to 'reading aloud' models of lecturing since the late 1970s and early 1980s (Flowerdew & Miller 1997:33).

2.3.6 Lecturers' strategies

Lecturers can use stress and tone to make lectures more comprehensible (MacDonald et al. 2000:261-262). They can also employ strategies such as pausing, using visual aids, and vocal hesitations to aid students' comprehension (Titsworth 2001:284). In addition, as lectures contain a special rhetorical structural organization (Miller 2002:146), lecturers can use discourse markers to signal lecture structure as discussed earlier. According to Titsworth (2001), L1 students note more detailed information and recall more information if lectures contain discourse markers (Titsworth 2001:285). These assist students to recall, analyse, interpret, or synthesise information (Titsworth 2001:293).

Following Flowerdew and Miller (1996), lecturers can also simplify their language by reducing their speech rate, reducing their range of vocabulary, and using repetition as a strategy. Flowerdew and Miller (1992) found that Cantonese speakers adjudged speech rate to be the greatest hurdle to overcome in comprehending lectures (Flowerdew in Flowerdew 1994:22). Flowerdew (1994) in Flowerdew (1994:22) poses four questions concerning speech rate: 1. Why do L2 students encounter problems with speech rate? 2. Can comprehension be improved by adjusting speech rate? 3. If it can, what are the most suitable speech rates for learners of different proficiencies? 4. Can lecturers consciously control their rate of delivery?

Conrad (1989) as cited in Flowerdew (1994:22) found that when native speakers could not understand fast speech, they employed their knowledge of the language to select syntax or grammar and predict content words. Heinrichson (1984) as cited in Flowerdew (1994:22) reported that reduction and contraction affected L2 students' listening comprehension more than that of L1. Both Conrad (1989) and Heinrichson (1984) have shown that L2 students are hindered in their need to understand fast speech by having to decode speech while L1 students can infer to fill in gaps in decoding.

Griffiths (1990) reported that lower intermediate L2 students understood significantly less when speech rates were 220 words per minute (wpm). Griffiths (1990) also found that the same students understood almost as much at an average speech rate (150 wpm) as at a slow rate (100 wpm). It would appear therefore that slowing down speech unnaturally does not enhance comprehension among L2 students (Flowerdew 1994:23).

Berquist (1994) in Flowerdew and Miller (1996:130) compared speech rate and pauses under three conditions: 1. speech at normal speed; 2. speech at slowed rate; and, 3. average speech rate with pauses. The comparison showed that students understood most under condition three. Flowerdew and Miller (1996:130) reported that L2 students perceived speed of lecture delivery and range of vocabulary as being contributory factors to their lack of lecture comprehension. They also found that L2 students regarded repetition as beneficial to their lecture comprehension. Lecturers could consider these findings when lecturing so as to provide opportunities for L2 students to free up working memory resources for processing.

For example, lecturers could facilitate processing by preparing skeletal notes that L2 students could complete. In this way, the notes would represent a framework or thinking map for students (Singer & Bashir 1999:269).

2.4 Academic Notetaking

According to Ryan (2001:289), the need to develop notetaking and listening skills for academic success is challenging for both L1 and L2 students. Research by Dunkel and Davy (1989:47) found that L2 students had problems with notetaking that included the comprehension of topics and subtopics and their relation to key information and additional information in lectures (Clerehan 1995:139).

James (1977) in Flowerdew (1994:11) considers notetaking a "five-stage process" comprising: decoding; comprehending; identifying major ideas; making decisions about when to note these ideas; and finally, writing quickly and clearly. It has also been described as an "important micro-skill in the lecture listening process" (Flowerdew 1994:13). The importance of notetaking lies in the fact that it functions not only as an aid to encoding but also as a method of storing lecture information (Clerehan 1995:137). Notetaking can improve both the chunking and encoding of information (Rubin 1994:213). With regard to storage, it can produce information for review at examination times.

Rost (1990) in Flowerdew (1994:14) divided notetaking styles into the following: topic-relation, concept-ordering, focussing, and revising notes.

Topic relation refers to writing down a word or phrase, copying, translating, or diagramming. Concept-ordering includes listing topics in order, labelling the main points in notes, and indenting. Focussing notes refer to highlighting and parenthesising. Flowerdew and Miller (1992) described how L2 students highlighted information pertaining to lectures in their textbooks (Flowerdew 1994:13-14). Revising is inserting and/or deleting information.

Ryan (2001:294-295) used metaphors to describe notetaking styles as in the following: the sponge; the tape recorder; the stenographer; the code breaker; the reporter; and the explorer. Each metaphor portrays students' notetaking styles as in the following:

1. the sponge who focuses hard on lectures and tries to soak up as much information as he or she can;
2. the tape recorder who writes every word to note complete lectures;
3. the stenographer who writes in shorthand and writes complete sentences later;
4. the code breaker who tries to decipher signals given by lecturers;
5. the reporter who tries to verify what is known about a topic when listening to lectures; and,
6. the explorer who follows the lecturer's guidance so that tracks can be retraced later.

Research into L2 students' notetaking began in the 1980s (Clerehan 1995:137). Since that time notetaking has been researched in an integrated fashion both from the point of view of lecture discourse structure and L1 and L2 notetaking behaviour (Badger et al. 2001:405).

Rickards et al. (1997:515) researched L1 notetaking to investigate lecture discourse markers and cognitive styles. They found that high-level information discourse markers had a significant effect on recall of lecture information if that information was noted down.

The reason for this is that discourse markers generated a 'structure search' in a listening context. When students did not take notes, discourse markers did not affect recall. Therefore, they found that discourse markers facilitated notetaking; the ephemeral nature of the listening process forces listeners to follow the pace of the lecture without being able review the input. In contrast, readers can self-pace and review reading material (Rickards et al. 1997:515).

Gilbert (1988), as cited in Titsworth (2001:287), states that students forget 25% of lecture information after a short time. However, a combination of discourse markers and notetaking can increase recall when discourse markers generate schemata in long-term memory and notetaking supports the encoding of information into existing long-term memory schemata. Consequently, this combination may help students to recall new lecture information for longer periods of time (Titsworth 2001:287).

Several studies such as Scerbo et al. (1992), as cited in Titsworth (2001:285), have shown a causal relationship between clear lecture structure and students' learning. Scerbo et al. (1992) hypothesised that the chunking of informational units by discourse markers permits students' short-term memory to operate more efficiently, which in turn supports schemata development in long-term memory (Titsworth 2001:285).

Titsworth (2001:294) found that discourse markers supported students' assimilation of facts into schemata, but not concepts into schemata. This could impact negatively on potential transfers of learning as facts noted from one lecture may not apply to other lectures. However, he also found that notetaking had a positive impact on both detail and concept tests. Kiewra et al. (1991) as cited in Rickards et al. (1997:508) found that when students took notes on high-level information such as topics and sub-topics, they recalled more high level information and in fact, more information overall than students who did not take notes. Rickards et al. (1997:508) stated that there is a paucity of quantitative research into the effect on comprehension of discourse markers and notetaking. They reported that one ethnographic investigation by Van Meter et al. (1994) supported the positive interaction and collaboration of these variables in the facilitation of lecture comprehension. As a result, they hypothesised that discourse markers in lectures could maximize notetaking and recall of information (Rickards et al. 1997:508-509).

Clerehan (1995) examined L1 and L2 notetaking in the context of a lecture on Law. She found that L2 students noted significantly fewer high-level informational units. Accordingly, Clerehan called for more research into what students are doing in lectures, advising that any investigation would need to look at both lecture discourse and features of students' notes. She advised that this research should be done in a naturalistic setting where real lectures are delivered rather than short talks unrelated to a course, a reading of a passage or videotaped lectures, all of which have been used in previous research (Clerehan 1995:151).

Finally, studies have found a correlation ranging from .28 to .53 between the number of ideas recorded in students' notes and recall on tests (Titsworth 2001:285). For example, Titsworth and Kiewra (1998), as cited in Titsworth (2001:285), found correlations of between .47 to .70 for noted ideas and recall. They also found that discourse markers noted by students correlated positively with test scores. According to Kiewra (2002:72), L1 students generally record between 20-40% of information in lectures. Even though students only note up to 40% of the details in lectures, notes have a positive impact on their examinations because they generate deeper processing and encoding in memory. Notes can also constitute an external memory aid for students (Titsworth 2001:285-286).

2.4.1 Notetaking behaviour: measurement

Dunkel and Davis in Flowerdew (1994:61) measured recall of lecture informational units by both L1 and L2 students. They did this by counting the number of informational units in a given lecture and then comparing those to the number of informational units recorded in the students' recall summaries. They found that L1 students took more notes than L2 students and that L1 students' recall summaries contained twice as many informational units as L2 students did. This supported Dunkel's (1988) L2 study of notetaking which found a positive correlation between the number of informational units in a lecture and successful recall of ideas and details as measured by multiple-choice tests (Chaudron et al. in Flowerdew 1994:80).

Chaudron et al., as reported in Flowerdew (1994:86), investigated notetaking quality. They used measures such as numbering, outline, examples, verbatim, diagrams, symbols, abbreviations, and words. They found low correlations between notetaking quality and test scores. However, they also found that students who took notes demonstrated positive correlations with comprehension as measured by a test. In addition, students who had noted key words accurately got higher scores in a cloze test than those who had noted key words inaccurately. Thus it would appear that noting key words inaccurately has the potential to disadvantage L2 students in the lecture theatre (Chaudron et al. in Flowerdew 1994:88).

Hansen (1994) analysed the notes of L1 students and L2 students. She used a framework that included an analysis of lecture discourse structure and lecture topics, sub-topics, and minor points (Hansen in Flowerdew 1994:138). While Hansen gave examples of extracts from student notes, she did not explain the analysis procedure in sufficient detail so that we do not know how the notetaking template was used to score the students' notes. At any rate, she did not find a significant difference between the notes of L1 and L2 students except that the L2 students recorded less information in each of the following categories: topics, subtopics, and minor ideas. In spite of the lack of any significant findings, Hansen maintained that comparing students' notes with a lecture notetaking template is a 'viable' way of measuring the quality of students' notes (Hansen in Flowerdew 1994:143).

In support of Hansen, Rost (1994) advised that a notetaking framework provides L2 students with strategies with which to cope with potential listening problems. Such a framework would alert students to the hierarchical nature of lecture discourse whilst simultaneously guiding students' notetaking. This in turn would facilitate students' awareness of the 'logical connective relationships' in lectures. The alternative to such a framework would be information recorded haphazardly and lacking organisation that could be difficult to analyse (Rost in Flowerdew 1994:113).

According to Rost (1990), there may be no straightforward correlation between quality of notetaking and listening comprehension levels (Flowerdew 1994:14). He adds that measures of notetaking quality alone may be insufficient in that they represent a 'rough mirror of understanding' and that researchers should get into the 'minds' of students to find out how much they comprehend (Rost in Flowerdew 1994:93). For the purposes of this analysis, the researcher followed both Hansen and Rost. As a result, notetaking quality including any 'logical connective relationships' was measured in this study. In addition, an exploration of participants' minds as they took notes was undertaken by using protocol analysis.

2.5. Summary

LLP Technology is in its infancy and has the potential to open up many teaching possibilities within the world of multimedia technology for L2 students. While the literature on the effect of discourse markers on academic listening is divided, it would appear that they can have a positive influence on comprehension and notetaking. However, an important question about how to teach discourse markers remains unanswered. If it is agreed that lectures contain high elemental interactivity, it follows that they can place a heavy burden on L2 students' processing capability during academic listening. Thus lectures can constitute a cognitive load for those students. LLP Technology may facilitate processing of lecture information through its capability to engender dual processing of information. Dual processing increases working memory resources that are critical for academic listening success.

To my knowledge research does not exist where LLP Technology has been employed in an L2 academic listening and notetaking context. In addition to the need to fill this gap in LLP Technology research, Goh (1998, 2000) asked how L2 students can be taught to parse informational units in lectures. Parsing is one of three listening stages described by Goh (2000). LLP Technology may support L2 students' academic listening and notetaking skills to the extent that they may be able to parse informational units more successfully. In the following chapter, there is a description of an initial study done to determine the effectiveness of LLP Technology in an authentic lecture situation.

CHAPTER THREE

The Liberated Learning Exploratory Study

3.1 Introduction

This chapter describes an exploratory research study that investigated the perceptions of both L1 and L2 students regarding the effectiveness of the Liberated Learning System as a supportive technology in a lecture theatre context. This initial study was undertaken by the author and research colleagues (Ryba et al. 2004). The purpose of the exploratory investigation was to look at the effectiveness of the LLP System in the context of an L1 (native speaker) and L2 lecture learning situation. The present investigation grew out of this exploratory study in that it followed its recommendations and focused more strategically on L2 students by concentrating on the effect of LLP on their academic listening skills and notetaking behaviour.

3.2 Method

Research Questions

The exploratory study was designed to explore the practical application of continuous speech recognition (CSR). The purpose of the study was to trial the use of CSR as a means of improving access to learning materials for

students with disabilities and English Language support needs.

Specific attention was given to:

- an examination of the viability of using continuous speech-to-text conversion in the university classroom;
- an investigation into students' perceptions and experiences with using LLP Technology to scaffold their instruction;
- a comparison of learning outcomes, study preferences, and class experiences of L1 and L2 students who elect to use the continuous text-to-speech conversion.

The specific questions guiding this study are:

1. What are students' perceptions of using the speech-to-text display and the streaming?
2. To what extent do students make use of the facilities?
3. What do students consider to be the main advantages of using LLP?
4. What are the limitations and problems reported by students?

Participants

Participants in this study were students enrolled in an introductory level information systems course (N=160) of whom approximately 50% were L2 students. In total, there were 81 L2 students and 79 L1 students who agreed to participate in the pilot project. Lecture 2 was attended by 139 students (L1=75) (L2=64). Lecture 3 was attended by 136 students (L1=71, L2=65). Lecture 4 was attended by 119 students (L1=64, L2=55). The three lectures were well attended both by L1 and L2 students which makes the results robust.

Informed Consent Procedure

At the first lecture of the term, the researchers presented information on the project and invited students to participate. All students were given an information sheet and consent form. Students who elected to participate in the project left their signed consent form on a chair next to the door as they exited the lecture theatre. It was stressed that participation in the project was not a course requirement and would have no effect on their grade. An advantage of the design is that all students could make full use of the LLP System and online streaming facilities whether or not they agreed to be included in the project. In order to facilitate a comparison of L1 and L2 students, participants were asked to print and sign their name on a consent form and on a questionnaire. Only the researchers had access to the data. The lecturer had no access whatsoever to email exchanges, online discussion forums or the class survey. The procedure for conducting this study was formally approved by the Massey University Human Ethics Committee.

Voice Recognition Training

The lecturer underwent training to develop a voice profile for the CSR system. This involved the lecturer with the aid of a computer technician inputting dialogue and vocabulary into a *ViaVoice*™ speech recognition system. This training is intensive and requires patience on the part of the lecturer to achieve a high level of accuracy.

The following is a description of the LLP System Set-up and a stand alone system was used for the exploratory study. This comprised:

1. a laptop computer;
2. a wireless microphone set;
3. *Viavoice* 10™ – local voice profile;
4. *Viascribe*™ display interface for automatically transcribing speech into text;
5. text output to single in-class display via data projector;
6. file storage on local hard disk;
7. file transfer and editing; and,
8. lecture files uploaded to internal network.

Prior to the commencement of each lecture, the system was set up to complement the existing instructional facilities (i.e. projector, microphone, *Powerpoint*™).The lecturer used a headset with a wireless microphone attached to a laptop computer. The lecturer's voice profile was then loaded so that the speech recognition could first be tested for voice quality.

The lecturer delivered a lecture and the acoustic information was translated via *Viascribe*™ into electronic text that was displayed by a beam projector onto a screen. *Viascribe*™ instantly creates a series of accessible multimedia files that can be easily published through learning portals such as *WebCT*™.

Post lecture, the electronic files were sent via FTP to the University of the Sunshine Coast for editing. The corrected files were then returned to Massey University where they were placed on a website accessible via the class *WebCT*™ site. Within the class *WebCT*™ site, students could select either the first or second part of each lecture that was recorded. They could then view the lecture text and hear the audio presentation simultaneously while viewing *Powerpoint*™ slides.

3.3 Measures

Email exchanges

The researcher sent an email after lecture two to each student inviting them to comment on the following points:

1. What are your initial impressions of speech recognition?
2. If the accuracy in the on-screen text could be improved, do you think this could help your learning?
3. What do you think the problems are with this technology?
4. Do you find the visual display of simultaneous text distracting?

WebCT discussion forum

All students had access to a class *WebCT*™ site to support their coursework. A discussion forum was set up within the class site concerning the use of the LLP Technology. Students who had agreed to participate in the project were invited to make comments on their own experiences and thoughts about using the text-to-speech conversion and the audio streaming. Students were reminded and encouraged at each lecture to post messages on the discussion forum.

Class survey:

The class survey was administered at the beginning of lecture 6 - two weeks after the last LLP trial lecture. This provided increased time for students to try accessing and using the streamed lectures via *WebCT*™ for revision.

The survey asked students to:

1. indicate which lectures they attended where the LLP System was used;
2. state how much of the speech-text display they made use of;
3. rate the extent to which they accessed and used the streamed audio and text files;
4. indicate their agreement or not with nine statements concerning the perceived effectiveness of the LLP System; and,
5. describe perceived advantages, problems, and suggested improvements.

3.4 Results

Email Responses from Students

A total of 10 email responses were received. The majority of these were positive indicating that the potential of LLP was recognised by both L1 and L2 students. The main themes in the responses were the use of compensatory strategies, the potential of LLP to distract from lectures, and the accuracy of the system. Following are some specific replies to the questions that were provided to the students. An L1 student reported the following with regard to strategies:

"This has great potential to be standard in lecture theatres Massey wide. I found myself glancing at it now and then to try and pick up a word or two. Excellent idea. Keep up the good work!"

The following is a response from an L1 special needs student:

"My initial impressions of speech recognition is very positive. I am deaf in one ear so it can help people like me who may find it difficult to hear or understand what the lecturer is saying."

This student recognizes the potential of LLP as an educational tool, but with the qualification that improvements should be made to it:

"Yes I do think this could help my learning if the accuracy was improved."

L2 students also used the system as a strategic tool with which to support any deficiencies in their academic listening skills as evidenced in the following response:

"The speech recognition is a fantastic idea to aid non-native students (like me!) I've been studying in English for a couple of years now, but since English is not my first language, I still sometimes have problems with my listening skill."

The following response from this same L2 student also contains a call for improvement in the LLP Technology:

"If the accuracy of the system could be improved, I would totally support the use of it at University; and I'm sure other non-native speakers would find the system helpful too."

L1 students also called for improvements in the accuracy of the LLP System as the following example indicates:

"I have no problems listening to the lecturer with the visual display of simultaneous text, however, occasionally, I will look at the on-screen text and laugh, which disrupts me and also, disrupts others students who sit around me".

L1 students complained about the potential of LLP to distract during lectures. The following email response is an example of how LLP can be distracting for L1 students:

"At this stage, the system has not yet achieved the right accuracy level, so I find it quite distracting at times. When I'm in the lecture, I often try not to look at the on-screen text as it's very amusing and the sentences don't often make sense; I might say that what appears on the screen are just lists of words rather than full, whole sentences".

The above response is also critical of the text display format, but this was a rare criticism. The following response is critical of the way LLP can distract from the lecturer:

"Shifts the focus from the lecturer. And by watching the lecturer you can actually learn a lot about public speaking skills and things like that so the lecture can become more impersonal".

This L1 student goes on to make a prediction about the future of live lectures based on the availability of streamed voice files:

"Also – students won't go to lectures they will wait for the file to be posted and learn that way which defeats the purpose of holding lectures".

The same L1 student complained about the colour of the background in the display:

"I have to try not to look at it all the time. The blue background colour hurts my eyes also."

Finally, the following positive comment suggests the existence of a social responsibility and empathy amongst L1 students for any potential deficiencies in L2 listening to lecture skills:

"It is an interesting concept. Good to see the university trying to assist students in new ways especially international students".

WebCT Discussion Forum

Approximately 30 postings from both L1 and L2 students were placed within the discussion forum. There was no posting from students who identify as having special needs. The responses were generally positive but also identified some of the problems and issues that need to be addressed. These issues were mostly the strategic use of LLP, the system's potential for distraction, and the system's inaccuracy.

On the issue of compensatory strategy use, the following is typical of comments received from L1 students:

"I found myself glancing at the screen a couple of times to try and confirm a word I missed in the lecture. If this system becomes more accurate, I would not be surprised if the voice recognition system became standard in lecturing at every university".

Postings usually contained both positive and negative comments such as the following:

"The only problems I have with it are its inaccuracy and initially it was almost a distraction. Great idea though. I feel proud to be part of a potential breakthrough. Keep up the hard work".

L2 students echoed those L1 responses by describing how the LLP System can support L2 learning in the lecture theatre. The following comment indicates strategy use among non-native participants:

"English is my first language but sometimes I had troubles hearing what was said. It worked out well that the parts I misheard the voice recognition picked up fine".

The following response indicates the extent of the support that LLP can offer L2 students to compensate for any deficiencies in listening comprehension:

"I think that is great!! Because English is our second language, it is not too bad when we can't hear the words from the teacher but we can see them on the screen."

Students also commented on the potential of the system to distract students during lectures. The following comment was posted by one L1 student:

"Sitting in the middle left of the auditorium, I found the real time text distracted me from what the lecturer was saying as it was in my field of view".

The next response from an L1 student blames this distraction on the system's inaccuracy. The following contains suggestions for improvements to the LLP System:

"The idea is good in theory. The interpretations as they are now have no benefit at all because none of the sentences make any sense! Obviously it would work better if the speaker spoke clear English. It is a joke putting the interpretations up as they are now. Currently the program is very limited but will be good when it is refined. For now, it is a distraction in class, however, some interpretations are quite amusing!"

L2 students also identified inaccuracies in the displayed text as being responsible for any distractions. This email is from such an L2 student:

"On the other hand, it is quite hard to pay all the attention to both and some pronounce on the screen is not right, which is different to what the teacher said".

The following posting from an L1 student sums up the general positive attitude towards LLP shown by both L1 and L2 students:

"I am pleased that Massey is developing innovative methods of lecturing. I found myself glancing at the screen a couple of times to try and confirm a word I missed in the lecture. If this system becomes more accurate, I would not be surprised if the voice recognition system became standard in lecturing at every university. The only problems I have with it are its inaccuracy and initially it was almost a distraction. Great idea though. I feel proud to be part of a potential breakthrough. Keep up the hard work".

Survey Responses

How much use did students make of the speech-text display?

Table 3.1 shows the participants' level of use. Over one third of all students (37%) reported that they did not use the display. These included 59% of L1 students, but only 18% of L2 students. This suggests that there may exist some need among L2 students for listening comprehension support in the lecture theatre. However, the table also shows that 43% of L1 students felt a need to use the display.

Table 3.1:

Ratings of speech-text display use

Count

		how much did you use the speech-text display					Total
		not at all	occasionally	sometimes	frequently	nearly always	
ESL	L1 students	45(59.6%)	24(30.4%)	10(12.7%)	0	0	79
	L2 students	15(18.8%)	27(33.8%)	30(37.5%)	7(8.8%)	1(1.3%)	80
Total		60(37.7%)	51(32.1%)	40(25.2%)	7(4.4%)	1(.6%)	159

How much did students access and use the streamed speech-text and audio files?

Table 3.2 shows that 73% of L1 students said that they did not need to access the files while only 24.7% of L2 students reported that they did not need to access the display. Overall slightly less than half of students (48.4%) said that they did not need the display.

This suggests that a majority of L2 learners had LLP support available for lecture comprehension if needed while a majority of L1 speakers did not need support. Slightly less than half (46.9%) of L2 students made use of the "streamed" lectures for review purposes while L1 students accounted for just 17.9%. Finally while the majority of students could access the files, 18.9% of students overall said that they could not access the files because of technical problems. This suggests that a number of L2 students feel that accessing the streamed lecture files is of use for review purposes. It would also indicate that a majority of L1 students neither want nor need to access the files. In addition, it would seem that almost one-fifth of students overall need support to access the files.

Table 3.2: Access to Streamed Text and Audio Files

Count

	were you able to access the streamed files			Total
	YES COULD ACCESS	NO DID NOT NEED TO	NO TOO MANY TECH PROBLEMS	
L1 students	14(17.9%)	57(73.1%)	7(9%)	78
L2 students	38(46.9%)	20(24.7%)	23(28.4%)	81
Total	52(32.7%)	77(48.4%)	30(18.9%)	159

Table 3.3 shows the frequency of use of the streamed files. Over two-thirds of L1 students (68.4%) reported not using the streamed files at all while over one third of L2 students (39.7%) said that they had not used them. Overall 51% of students said that they did not use them. While 60.2% of L2 students said that they had used the files, less than one-third of L1 students (31.6%) reported the same. Overall 48.9% of students used the streamed files. Table 3.3 indicates that while a majority of L1 participants ignored the streamed lecture files, a significant number felt that accessing the streamed lecture notes was beneficial for their study. It also might reveal the high need for listening comprehension support that L2 students require during lectures.

Table 3.3:

Ratings of the extent to which students used the streamed files

	How much did you use the streamed files				Total
	not at all	1-2 times	3-5 times	more than 5 times	
L1 students	26(68.4%)	10(26.3%)	2(5.3%)	0	38
L2 students	23(39.7%)	26(44.8%)	7(12.1%)	2(3.4%)	58
Total	49(51%)	36(37.5%)	9(9.4%)	2(2.1%)	96

How effective did students perceive the project to be?

Students were asked to rate their perceived effectiveness of the LLP System on a number of different factors. They were asked to rank their views on how effective LLP was by choosing from the following: strongly agree; agree; disagree; strongly disagree. Table 3.4 shows that slightly over two-thirds of all students consider that the LLP Technology can be beneficial to students' learning from lectures. It also indicates the significant differences in the perceptions of L1 and L2 students on these beneficial effects. Table 3.4 appears to confirm the need for listening comprehension support among L2 students. Over two-thirds of L2 students felt that the speech-to-text display aided their comprehension of the three lectures. In addition, over three quarters of L2 students felt that using the streamed lecture files increased their comprehension of the lectures.

Conversely, 80.5% and 74% of L1 students disagreed that the display and the streamed files respectively supported their comprehension of the lectures. This indicates significant differences in how students feel about the effect of LLP Technology on their notetaking. Less than one-quarter of L1 students said that the display helped them to take notes and almost three-quarters of them reported that the streaming did not aid their notetaking. On the other hand, 63.3% and 72.7% of L2 students reported beneficial effects of the display and the streamed files respectively on notetaking behaviour.

Table 3.4 shows that over half of students overall thought that LLP was successful. 58.8% of L2 students regarded the project as successful while 34.3% of L1 students thought so. This suggests that slightly more than two-fifths of L2 students found that LLP had failed to give them adequate support. Nevertheless, at least three quarters of L2 students said they would like to have LLP in their other classes and almost three quarters of L2 students thought that LLP was easy to use. Over half of L1 students, on the other hand, would prefer not to have LLP in their other classes, although over half of L1 students again found it easy to use. In addition, over half of L1 students would recommend LLP to their friends suggesting possibly that many of them recognise the potential of LLP for students with language support needs.

Table 3.4:

Perceptions of the Effectiveness of the LLP System

Table 3. 4 crosstabulations		Strongly disagree	Disagree	Agree	Strongly agree	Total
The display helped me to understand the lecture	L1 students	21 (27.3%)	41 (53.2%)	14 (18.2%)	1 (1.3%)	77
	L2 students	3 (3.7%)	23 (28%)	50 (61%)	6 (7.3%)	82
	Total	24 (15.1%)	64 (40.3%)	64 (40.3%)	7 (4.4%)	159
The display helped me to take notes	L1 students	21 (27.6%)	39 (51.3%)	15 (19.7%)	1 (1.3%)	76
	L2 students	4 (5%)	28 (35%)	42 (52.5%)	6 (7.5%)	80
	total	25 (16.02%)	67 (42.9%)	57 (36.5%)	7 (4.9%)	156
I think most students can benefit from the Liberation Learning Project	L1 students	5 (6.8%)	23 (31.5%)	41 (56.1%)	4 (5.5%)	73
	L2 students	1 (1.3%)	21 (26.3%)	53 (66.3%)	5 (6.3%)	80
	total	6 (3.9%)	44 (28.8%)	94 (61.4%)	9(5.9%)	153
The streaming of the lecture helped me to take notes	L1 students	13 (22.8%)	30 (52.6%)	13 (22.8%)	1 (1.8%)	57
	L2 students	2 (2.6%)	19 (24.7%)	48 (62.3%)	8 (10.4%)	77
	total	15 (11.2%)	49 (36.6%)	61 (45.5%)	9 (6.7%)	134
The streaming of the lecture helped me to understand	L1 students	16 (27.5%)	27 (46.5%)	14 (24.1%)	1 (1.7%)	58
	L2 students	2 (2.5%)	19 (23.8%)	53 (66.3%)	6 (7.5%)	80
	total	18 (13%)	46 (33.3%)	67 (48.6%)	7 (5%)	138
The Liberated Learning Project was very successful	L1 students	9 (12.3%)	39 (53.4%)	25 (34.2%)	0	73
	L2 students	4 (5%)	29 (36.3%)	45 (56.3%)	2 (2.5%)	80
	total	13 (8.5%)	68 (44.4%)	70 (45.8%)	2 (1.3%)	153
I would recommend Liberated Learning to my friends	L1 students	12 (15.8%)	22 (28.9%)	39 (51.3%)	3 (3.9%)	76
	L2 students	1 (1.3%)	17 (21.5%)	57 (72.2%)	4 (5%)	79
	total	13 (8.4%)	39 (25.2%)	96 (61.9%)	7 (4.5%)	155
I would like to have Liberated Learning in my other classes	L1 students	16 (21%)	28 (36.8%)	27 (35.5%)	5 (6.6%)	76
	L2 students	2 (2.5%)	18 (22.5%)	50 (62.5%)	10 (12.5%)	80
	total	18 (11.5%)	46 (29.5%)	77 (49.4%)	15 (9.6%)	156
Liberated Learning is easy to use	L1 students	8 (11.4%)	24 (34.3%)	32 (45.7%)	6 (8.6%)	70
	L2 students	3 (3.75%)	20 (25%)	53 (66.25%)	4 (5%)	80
	total	11(7.3%)	44 (29.3%)	85 (56.6%)	10 (6.6%)	150

What did students think were the main advantages, problems and suggested improvements that were needed?

Table 3.5 presents a thematic analysis of comments given by students on the following:

1. What do you think are the main advantages of the Liberated Learning system?
2. What do you think are the biggest problems with using the Liberated Learning system?
3. Is there anything that you think should be improved? If yes, what should be improved and why?

A majority of students felt that accuracy is an important variable in determining the success and future of LLP. Over half of participants thought that a lack of accuracy had a negative impact on learning while slightly less than one third of participants wanted accuracy to be improved. A typical theme comment was the following:

"If the accuracy increases it will be possible to take more comprehensive notes if the student doesn't understand what the lecturer is saying".

Over one-quarter of participants felt that LLP was useful to them for revision purposes. In addition, the potential of LLP to support notetaking ability was mentioned by a number of participants. In this regard, some students highlighted the strategy value of LLP by commenting on their ability to scan and read the words on the screen.

Other participants found that the display was interfering with learning and constituted a distraction. It has to be noted here that the lecturer used *Powerpoint*™ displays during the three lectures thus compelling the students to split their attention between the speech-to-text display, the lecturer and the *Powerpoint*™ display. This may have caused the overloading of students' processing mechanisms. Overall, however, the themes identified in Table 5 demonstrate some recognition of the value of LLP as a support for L2 students' listening comprehension needs and also as a support for notetaking ability.

Table 3.5:

Thematic Analysis of Advantages, Problems and Suggestions for Improvement

Theme	Positive Statements	number
Comprehension	Helps me to understand	28
Visual	See the words easily	17
Study	Helps me to study English	1
Review	Able to review the lecture to see if there were any concepts missed in my own notetaking	39
Learning	Helps student learning well	4
Notes	If the accuracy increases it will be possible to take more comprehensive notes if the student doesn't understand what the lecturer is saying	14
Concentration	To help people who have difficulty taking notes and concentrating at the same time	1
ESL	I think it is more valuable for students whose English is a second language	25
Accent	Helps us to understand what is said – accents can be difficult	2
Theme	Negative statements	
Distraction	It was hard to read and served as more of a distraction	31
Not accurate	It would be useful if it was more accurate	82
Colour	The background was too bright –it should be at least darker than the lecture slides	1
Theme	Improvements	
Accuracy	Make the words correct and clear	53
Speed	The speed of the system	5
Review only	Maybe it should be recorded and put on *WebCT*™ but not put on screen during class	6
Use LL in other classes	Hope can use it in my other class	1
Colour	Background colour should be darker (darker than lecture slides when in class) found it distracting in class	1
Easy to access	Should make it more easy to access	3

3.5 Discussion

The exploratory study provided some overall evidence that the LLP Technology has the potential to enhance student learning in a number of important ways. This was evident in the survey responses, email comments and postings on the discussion forum. The perceived benefits include enhanced comprehension of lectures and improved notetaking skills.

A notable feature of the project was that students felt involved in pioneering a new application aimed at creating better conditions for learning. Several students commended the project and expressed a desire to see the project extended because they considered that it would be beneficial to L2 students and students with learning needs as inferred from the following comment:

"I feel proud to be part of a potential breakthrough"

L2 students comprised one-half of the overall sample of participants. Comparison of L1 and L2 students showed that there were significant differences in how students perceived the benefits of the LLP Technology. L1 students, while welcoming the use of this new technology, felt that it would be more beneficial for L2 students. These L1 perceptions are in keeping with previous anecdotal research findings, which report benefits mainly for special needs students and L2 students. Many L1 students found the text display distracting as they had to split their attention between lecturer, screen and *Powerpoint*™ display.

Almost twice as many L2 students as L1 students reported that they had used the streamed speech files. Nearly three times as many L2 students as L1 students said that they needed to access the streamed files and twice as many L2 as L1 students reported using the files. Consequently, the benefits of LLP seemed to have been felt more keenly within the ranks of the L2 students than L1 students. More L2 students than L1 agreed that LLP was effective in supporting their learning. In fact, more L2 students than L1 agreed that LLP aided both their listening comprehension and notetaking skills. In addition, more L2 students considered that LLP was successful and significantly, more L2 students than L1 agreed that they would like to have LLP in their other subject classes.

L2 students find lectures challenging and they have difficulty understanding the main and supporting points of lectures. They also have problems with the discourse structure of lectures, speech rate, and vocabulary amongst other items. The majority of L2 participants recognized the potential of LLP to support their learning. According to Moreno & Mayer (2002:156), redundant information presented in two modes (text and narration) and containing similar words processed aurally and visually can support the recognition and learning of that input. Thus, in keeping with the finding of Moreno and Mayer (2002), L2 participants used strategies such as scanning the text display when they missed parts of the lectures. In this way, LLP can provide much needed support for L2 students in the lecture theatre as L2 students process aural text with the help of simultaneously displayed on-screen text (Jones & Plass 2002: 548).

It was notable that some students mentioned the benefits of having speech recognition for words with which they had trouble hearing or were unfamiliar. Clearly, one of the benefits of LLP is that it can be taught to recognise technical words and speech patterns that are regularly mentioned and important for understanding the lecture content. This can assist students, especially those from other languages, to focus on the instructional material with more visual text scaffolding than would otherwise be possible in the conventional situation.

A significant number (52) of students overall accessed the streamed files and found these useful for reviewing the lectures, as indicated in the results. In projects of this kind, the streaming aspect is essential as an extension of the in-class speech-to-text conversion. This has perhaps the greatest potential to improve learning as it makes it possible for students to review the lecture in its entirety as through they were actually present. The addition of video would make it possible to capture all of the lecture and interactions in both visual and auditory form. The potential of LLP for distance education is extremely significant and is now ready for further development by tertiary institutions who wish to deliver their programmes both nationally and globally.

Not all students will benefit from the LLP Technology. The most effective use of the system would appear to be as an adjunct to the existing lecture approach and as a means of capturing the lecture material for later presentation or streaming over the internet.

While many students in the present project said that they did not need the support of LL, it may be that they would benefit from the lecture review opportunities that it provides, especially in preparation for examinations. The practical consideration is that students should be encouraged to access and use the streamed lecture material for review along with other conventional approaches.

One of the issues with introducing this form of technology into the lecture theatre is the set-up time and the procedure, which can be somewhat distracting for students at the beginning of a class. To overcome this issue somewhat, the researchers provided information to students and had a dialogue with them about the project activities. This approach was helpful for creating a sense of participation amongst the class.

The project was originally scheduled for an entire University term (12 weeks) although due to the early departure of the participating lecturer overseas, it was essential to abbreviate the project. The three-week pilot was useful, however, for working out the systems and arrangements that were needed to support a larger project. This included: (1) working out how to record and then prepare files for editing; (2) how to make the files accessible so that they could be streamed in conjunction with *Powerpoint*™ presentations and other applications; (3) setting up a discussion forum on the class *WebCT* ™ site; and, (4) developing a survey to measure students attitudes and experiences.

Accuracy of the speech recognition was a significant limiting factor in the present study. This is evident in the fact that students in the survey commented on the need for improved accuracy. It is estimated that accuracy was at approximately the 85 percent level and that ideally this needs to be improved. It should be kept in mind, however, that the participating lecturer only had a limited speech training period of 2-3 hours and the fact that she was a second language speaker no doubt had an effect. Considering these factors, the accuracy level was quite reasonable and in most cases was acceptable to students in the class. There is definitely room for improvement of speech-to-text conversion accuracy and no doubt this can be achieved through a larger amount of training and improved acoustics and other technical factors.

3.6 Conclusion and Practical Recommendations

Experiences gained in this exploratory project indicate a number of areas in which improvements could be made and areas where further research and development work could be undertaken:

1. Improved speech recognition accuracy – this could be achieved through increased speech training within the classroom situation along with practice in using the system prior to the commencement of the academic term.

2. Improved set-up procedure that is less distracting – the most effective approach would be to incorporate the LLP System into the technological set-up of the lecture theatre or classroom. Alternatively, adequate time needs to be available prior to the class in order to prepare so that the LLP System is ready to commence at the outset of the lecture once a sound check has been carried out.
3. More interactive features to improve communication with students – e.g. working as a class to identify significant points for discussion that are then read onto the speech text screen so that everyone can see the points raised. A more elaborate example would be a class consultation to develop a statement on how to solve a particular problem or issue.

   The statement would then be read and made available online.
4. Seating arrangements so that there is a specific area where people who wish to see the speech-text screen can chose to sit in that area. The screen is dominant and easy to see in this area and does not distract others who do not which to view the speech text.
5. As a result of the positive survey responses in the exploratory study by a majority of L2 students concerning the impact of LLP on their academic listening and notetaking (68.3% and 60% respectively), it was decided to carry out a more focussed study. This study would examine actual evidence of the impact of the technology on L2 students' academic listening and notetaking. With the specific purpose of collecting the requisite data, the author conceptualised and designed the main research study to explore the effect of LLP on notetaking, listening comprehension, listening strategies, and affective strategies in a lecture context.

6. Selective use of speech recognition is preferred. For example, certain sessions where material is largely visual in form or there are discussions may not be conducive to LLP whereas formal lectures especially introducing new concepts, vocabulary and technology may benefit especially from the use of speech recognition.
7. Active participation of students in the LLP process could lead to a greater sense of involvement in class activities. Interactive methods could promote more active and meaningful participation in class.
8. Dual Processing Theory would indicate that split attention problems need to be carefully managed. This could be accomplished by providing students with some advice on when and how to use the LLP System within the class. For example, L1 students may only use the system occasionally in-class to check spelling or pronunciation and refer to the streamed text afterward for a full review of the lecture.

In conclusion, this is a promising technological approach that has great potential for enhancing learning outcomes. There is a need, however, to match the technology more carefully with the pedagogical processes in order to ensure that better learning conditions are created. There are many issues and limitations that need to be resolved but current work within the consortium in partnership with the ICT industry will help to improve the effects. A key factor in favour of speech recognition in the way that it has been applied here is to provide universal access and support to a full range of students including those with special needs and for speakers whose first language is not English.

While the exploratory study focused on the perceptions of both L1 and L2 students *viz a viz* the LLP Technology as employed in the lecture theatre, it was clear that further research was required. This would focus on specific areas of academic listening such as comprehension, strategy use, and notetaking in an L2 classroom context so that data could be collected to measure the effectiveness of the technology on these areas. In this way, the present study was informed by the exploratory study.

Chapter Four

Main Study Conceptual Framework

4.1 A conceptual framework for LLP Technology

This chapter outlines a framework for the present study based on an integration of the main elements first discussed in the literature review along with information gained from the exploratory study. The research aim is to test the effectiveness of the LLP Technology based on an analysis of theory as applied to practice. To achieve this aim, the research design adopts a comprehensive multi-method approach in order to systematically gather evidence.

The first theory that underlies this research is Cognitive Load Theory (Pass et al. 2003). In this context, this theory pinpoints the task difficulty that L2 university students generally have to cope with in order to understand monologues in English. Consequently, a typical lecture may be described as being high in elemental interactivity thus requiring L2 students to be able to understand a matrix of interrelated elements in lecture discourse in order to comprehend the whole lecture. A second task that L2 students perform at university is notetaking. Thus, the cognitive load increases as students split their attention between lecture and notetaking.

A second theory, referred to as Dual Processing Theory (Mayer & Moreno 1998), hypothesizes the support that L2 students can get from two encoding modes: the auditory channel and the visual channel. This support can come from LLP, a technology that enables L2 students to both hear and see digitised text displayed on a screen. With regard to lectures, the LLP Technology can provide support for L2 students who can follow lectures by listening and scanning the screen. As lectures are complex entities and difficult to understand for L2 students, the extra visual support afforded by LLP may be beneficial to L2 comprehension and notetaking.

In addition to comprehension, L2 students' strategy use can be affected by the LLP Technology. The variation in quantity and quality of strategy use among L2 students is linked to levels of listening comprehension. However, as the technology is innovative and a potential addition to the L2 classroom, L2 strategy use may evolve as experience of using the technology grows.

In the present study, the lecture delivery style is 'reading aloud' and information-driven lectures are used because their discourse structure complements the notetaking framework that in turn facilitates scoring of participants' scores. The researcher has designed a notetaking framework with a view to further decreasing cognitive load by scaffolding the recording of information without stifling notetaking styles. There are four strands to this investigation: Cognitive Load and Dual Processing Theories; Liberated Learning Technology; listening strategy use; and lecture discourse structure.

Figure 2 Conceptual Framework for LLP

(adapted from Mayer and Moreno 2003:44)

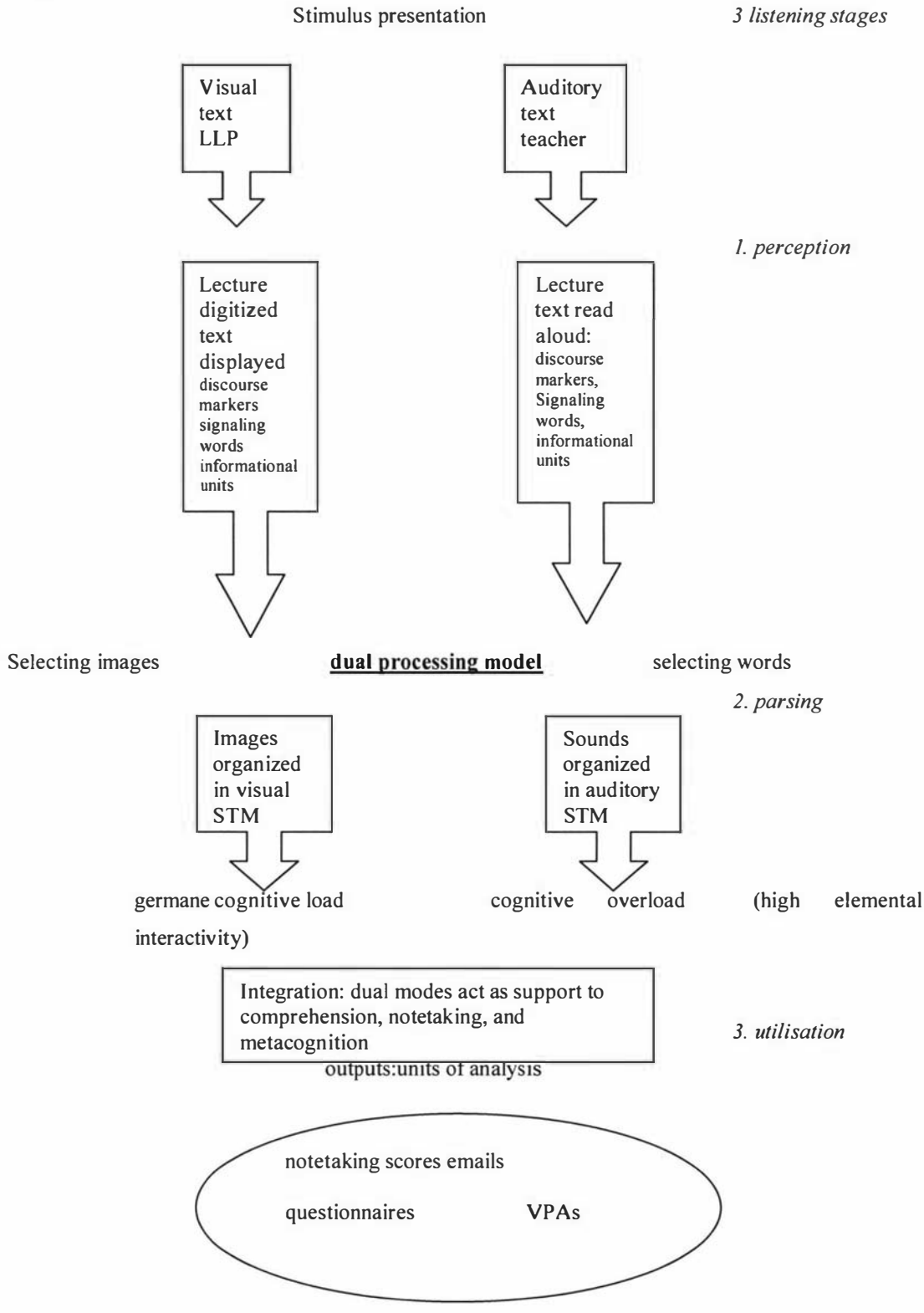

Figure 2 above depicts a model of human processing that assumes the following: 1. information processing comprises two separate channels: an auditory one for sounds and a visual one for images; and, 2. each channel has a limited capacity for comprehension.

The five stages depicted in the process in figure 2. are as follows:

1. the teacher begins to read the lecture and CSR digitised text appears on-screen;
2. the participants hear sounds of words and see the images of words on-screen;
3. the participants use a metacognitive selection strategy to choose important lecture words for processing using both a visual and an auditory mode;
4. the words are held and manipulated in STM and then organised into syntactic structure and integrated using visual and auditory modes;
5. the words are then linked to background knowledge, meaning is derived, words are recorded, and the lecture is evaluated.

Embedded within this process are the following listening stages:

perception: the initial recognition of words from sounds

parsing: the organisation of words into recognisable syntax

utilisation: the linking of the organised words to background knowledge to derive meaning.

L2 listeners have limited STM capacity for holding information and manipulating it (Meskill 1996). The informational units in lectures contain high elemental interactivity that may exceed STM capacity thus cognitively overloading L2 listeners. Conversely, the task of tracking informational units that have been converted to on-screen digitised text constitutes germane cognitive load. As dual processing is the presentation of information in visual and auditory mode, it renders the information redundant and therefore more comprehensible to L2 students. Consequently the dual task of listening and reading should constitute germane cognitive that enables students to more effectively comprehend the high elemental interactivity in lecture informational units.

Lectures place a heavy processing load on L2 listeners (Thompson 2003:5). Liberated Learning aims to give support in listening comprehension. In doing so, it may give L2 listeners the ability to compensate for any deficiencies in listening comprehension (Leitch & MacMillan 2003:10). In fact, LLP Technology may break the "negative cycle of expectation" by supporting instruction in lecture discourse structure and listening strategies.

In Dual Processing Theory, cognitive load is lightened when aural text is supported by visual written text. In this way, limited working memory resources are not overstretched so that learning can be promoted (Paas & al. 2003:2). For example, students understood a scientific cause and effect text better when it was presented in both aural and in written form than when it was presented in one modality only.

This learning was attributed to the dual processing capacity of working memory (Moreno & Mayer 2002:156). Working memory is made up of a central executive and two STMs: the phonological loop for processing messages in verbal form and the visuo-spatial sketchpad for processing information in image form (Lee & Kang 2002:64). When students listen to a lecture and simultaneously see digitised text on a screen, they can select both aural and visual information without being overloaded cognitively. This effect is the result of the independent working of the STMs in working memory which allows extra processing capacity to be created (Moreno & Mayer 2002:162). In this way, information to be processed is divided between these two systems (Mousavi et al. 1995:331) resulting in enhanced learning (Mousavi et al. 1995:332).

Information is processed in a similar fashion in both reading and listening. Both employ verbal codes to process information and they generate the use of similar cognitive processes that aid students to form concepts from the information (Jones & Plass 2002:548). L2 students can metacognitively select aural and written information to understand a text and construct links between these formats to build a mental model of the information (Jones & Plass 2002:548). In this way, L2 students who listen to lecture comprehension may be aided by processing the aural text with the support of on-screen digitised text (Jones & Plass 2002:548).

An important underlying construct that determines the effectiveness of the LLP System with individual students is their metacognitive awareness when listening and reading. The following three metacognitive strategies are of importance to this study: selection, concentration, and evaluation.

Selection is important for comprehension and the recording of information as the L2 listener tries to selectively listen for lecture discourse elements such as frame markers and record the salient points of lectures. Concentration is required for the monitoring of listening input even at times where comprehension problems may arise. Evaluation reflects a higher level of listening ability as students can become aware of how and why they comprehend listening input and why their comprehension fails.

Research in multi-media learning for students of other languages has concentrated on how to improve listening skills or alternatively, on how deficient listening skills can be compensated for (Jones & Plass 2002:547). The present study focuses on how listening skills can be improved in combination with the use of strategies to compensate for missed information with the support of LLP Technology. The effectiveness of the LLP System is measured through:

1. an analysis of notetaking quality
2. email dialogues with students concerning their perceptions and experiences with using LLP to support learning
3. questionnaire responses concerning students' perceptions and experience
4. verbal protocol analysis style interviews (VPAs).

In sum, this study adopts what could be called an 'inclusive research framework' that is informed by a set of theoretical perspectives that collectively explain information processing and executive functions. Particular attention is given to an analysis of the metacognitive system through gathering information on students' awareness and self-regulation of thinking processes. Evidence for the effects of CSR is gathered through direct analysis of notetaking as well as information based on students' perceptions and experiences with using the system.

Chapter Five

Method

5.1 Method

This chapter outlines a detailed description of procedures for the main study. It also outlines preliminary work that was undertaken to trial some aspects of data collection and an analysis of practice effects that may result from a repeated lecture. The chapter also offers a detailed explanation of the procedures that were followed in designing and administering the assessment items. The measures included notetaking samples, verbal protocol analysis, a questionnaire and email responses.

The main study builds upon the exploratory investigation by focussing specifically on measuring the effects of LLP Technology on notetaking, listening strategies, affective strategies and lecture comprehension. Originally, the researcher decided to collect students' 'freestyle' notes and in exchange offer a complete set of researcher-prepared notes. However, freestyle notes had the potential to be difficult to analyse and score. As a solution, the researcher adopted a framework that would facilitate scoring but not overly constrain notetaking styles (see appendix D).

This framework was adopted from a Massey University reading aid for L2 students (Students' Learning Centre, Massey University 2002).

In order to explore the effect of LLP Technology on strategy use among the participants, a verbal protocol analysis was adopted as a means of studying the participants' thinking processes and strategy use. A detailed explanation of this measure is presented later in this chapter. To help ensure that these measures were valid and reliable, a trial study was undertaken.

5.1.1 The Trial

The researcher arranged for the teacher and three students to meet on a chosen day for a trial practice lecture in preparation for the main study. The teacher read a lecture on nicotine addiction (see appendix E) twice to the students: once without the support of continuous speech recognition (CSR) and once with the support of CSR. Before each reading, a notetaking framework was given to each participant and this was collected immediately after each reading. Between each reading, there was a three-minute musical interlude to provide a point of separation between the two administrations.

Following the readings, each student was interviewed using verbal protocol analysis and the interviews were recorded. This involved the use of a textbook question sheet (see appendix F) normally used for the lecture on nicotine addiction.

Thus during the interview the participants had to: 1. listen and write information heard on the question sheet while thinking aloud; and, 2. listen and monitor the on-screen text while writing on the question sheet and thinking aloud.

It was found, however, that the use of the question sheet had the effect of cognitively overloading the participants. The reading of the questions caused split attention and therefore used up short-term memory resources. In real terms, the participants were required to listen to a lecture, scan the LLP screen, read questions and write relevant information on the question sheet. As a result, it was decided to use the notetaking framework for the main study protocol interviews and discard the question sheet

Table 5.1 below contains the results of the trial for three individual students. The numbers in the top row refer to the maximum score possible in each category and comprise a total score of 74. As can be seen, Hari noted 7.7% more topics with the support of CSR. She noted 8.7% more key information with the support of CSR. She noted less additional information with the support of CSR. Overall, Hari noted the same percentage of accurate information with and without the support of CSR.

Fadya noted 15.3% fewer topics during listening two. She noted 17.4% more accurate key information with CSR support. She noted 33.4% more accurate additional information with CSR support. Overall, Fadya noted 14.9% more accurate information with the support of CSR.

King noted 23% more accurate topics with support of CSR. He noted 2.2% more key information with support of CSR. He noted 13.3% less accurate additional information with CSR. Overall, King noted 2.7% more accurate information with the support of CSR.

Table 5.1

trial scores

Name	topics N=13	key information N=46	additional information N=15	total N=74
Hari	+7.7%	+8.7%	-33.3%	NC(39%)
Fadya	-15.3%	+17.4%	+33.4%	+14.9%
King	+23%	+2.2%	-13.3%	+2.7%
Mean	+5.1%	+9.4%	-4.4%	+5.4%

NC means no change: the score stays the same in both listening one and two

Overall, the results of the trial show a small increase for King, a significant increase for Fadya, and a 'no change' for Hari. To assess the significance of Fadya's increase, an analysis of practice effects was done.

5.1.2 An analysis of practice effects

Following the trial session, an analysis of practice effects was carried out to measure the potential increase in notetaking when the same lecture is read twice without the support of CSR. This analysis was conducted in the same way as the trial with the exception that CSR was not employed.

The same lecture on nicotine addiction was used for the purpose of the trial. Participants in the analysis of practice effects comprised a group of eleven students whose level of English ranged from intermediate to upper-intermediate. The sample was chosen because all participants were EAP (English for Academic Purposes) students who had received conditional offers from universities thus eliminating them from the main study.

Table 5.2 shows the results in notetaking for these eleven students. According to Hansen and Jensen in Flowerdew (1994:251), a first listening should give the listener information that 'primes' him or her to predict and interpret information more accurately during the second listening. Thus one would expect listeners to improve the quality of their recorded information during the second listening. One key practice effect finding was that one upper-intermediate level student scored the highest increase in recorded information (10.8%). Taking this increase in notetaking into account, the researcher set 11%+ as the baseline percentage necessary to show an effect for CSR support during listening to lectures. For example, during the trial session, Fadya scored a 14.9% increase in notetaking with the support of CSR which equates to 3.9% above the practice effect score of 11%. Therefore, it can be assumed that she recorded 3.9% more accurate notes with the support of the LLP Technology. In sum, the practice effect data as shown in table 5.2 indicates that the highest score increase in the repeated comparison was 10.8%. A decision was then made to set the practice effect at 11%. In other words, a conservative assessment of the effects of CSR was derived by subtracting 11% from each student's score. As a conservative estimate, 11% was thus set as a practice effect size.

Consequently, in the main study any notetaking score above 11% in a repeated lecture can be attributed to the effect of CSR and not a practice effect.

Table 5.2 shows the Practice Effect scores. As can be seen, four students only slightly increased their scores and two students scored a 4% and a 5.4% increase respectively. Interestingly, the participant who scored highest during listening one increased his score by only 2.7% during listening two. Significantly, the 10.8% increase was twice as large as the next highest score (5.4%). One counter-intuitive finding was that three students scored decreases in information recorded between listening one and listening two.

Table 5.2

Practice Effect scores

name	topics	key information	additional information	total
Kenny	-7.7%	+2.2%	+6.7%	+1.3%
Yong	-7.7%	+2.2%	+13.4%	+2.7%
Tong	-15.4%	+6.5%	NC	+1.4%
Weilin	+7.7%	NC	+13.3%	+4%
Terry	-7.7%	+10.9%	NC	+5.4%
Ning	-7.7%	NC	+13.3%	+1.3%
Ambrosia	-7.7%	-4.4%	+6.7%	-2.7%
Baker	+15.4%	-2.2%	NC	+1.4%
Tem	+7.7% +10.8%	+10.9%	+13.3%	
Bruce	NC	-4.3%	+6.7%	- 1.3%
Kevin	NC	-4.4%	NC	- 2.7%
Mean	-2.1%	+1.6%	+6.6%	+1.9%

NC means no change: the score stays the same in both listening one and two

In sum, the decision to set the practice effect at 11% was considered to help in the provision of a conservative score for the purpose of the main study.

5.1.3 Main study

Introduction

The main study focused on the application of continuous speech recognition in the language classroom and extended the work done in the exploratory investigation described previously in chapter three. The specific purpose of this present study was to trial continuous speech-to-text in an L2 language learning classroom context as a tool to support listening comprehension, listening strategies including affective strategies, and notetaking skills. Specific attention was given to:

a. an examination of the effectiveness of CSR as a technology used to support academic listening;
b. an investigation into students' strategy use with CSR; and,
c. an analysis of notetaking samples without and with CSR to scaffold listening comprehension.

The main study aimed to find answers to the following question:

"In what ways and to what extent can LLP Technology support academic listening and notetaking in an L2 classroom context?"

The following research questions were used as a specific focus for the main study:

1. To what extent, if any, does LLP affect notetaking skills?
2. To what extent, if any, does LLP affect academic listening?
3. To what extent, if any, does LLP affect listening strategies?
4. To what extent, if any, does LLP have an effect on affective strategies? (Dhieb-Henia 2003:389).

Table 5.3 below shows a 'crosswalk' of the methods to be employed in this investigation as matched to the above research questions.

Table 5.3 Data collection methods crosswalk showing a match between methods and research questions

Research questions	notes	emails	questionnaire	protocols
LLP's effect on:				
Listening comprehension	X	X	X	X
Listening strategies		X	X	X
Notes analysis	X			
Affective strategies		X	X	X

5.2 Method

Participants

The sample consisted of one group of six L2 students. The participants had the following levels of English ability: pre-intermediate (Resa, Stephen); intermediate (Benny); upper intermediate (Makiko, Amber, Arina). All the participants were enrolled in an English Language course at Massey Language Centre and all except Resa intended to study at an New Zealand university (Dhieb-Henia 2003:394). Stephen missed lecture one because of personal problems.

Ethical Considerations

The participants were informed that the research design would be advantageous to them in that they would attend a challenging academic listening skills course employing an innovative technology. They were also told that their identities would be protected and consequently, pseudonyms were used in results sections and transcripts. The results were treated as confidential and each participant had access to his or her results at any time if they wished to see them. The participants were assured that their level of participation would not affect their course grade and that they were free to withdraw at any stage of the investigation. The researcher explained to the participants that this research had been formally approved by the Massey University Human Ethics Committee and that he would be the only person who would have access to the data (see Appendix G)

Voice recognition training

The researcher trained the teacher to develop a voice profile for the CSR system. The training period lasted one hour per week for five weeks and involved reading textbook lectures into the *ViaVoice*™ speech recognition system. The training differed from that of the exploratory research in both length and intensity. It required the teacher to practice repetition of words and phrases until the correct version appeared on the screen. The teacher was also trained in how to set up the system. The teacher sat during lectures to reduce potential incidences of split attention caused by paralinguistic features. Speaking from a sitting position was practised during training.

5.3 Measures

5.3.1 The Questionnaire

The questionnaire (see appendix H) was adapted from an earlier version (see Appendix C) used in the exploratory phase of this research (Ryba et al. 2004). The questionnaire was designed to gain more specific information about the participants' perceptions of the effectiveness of CSR as a teaching tool in the L2 classroom. The overall aim of the questionnaire was to get information from the participants that could then be used to improve the teaching of listening with the support of CSR in future language courses (Lynch 2003:68).

The questionnaire consisted of 25 closed Likert-type items and three open-ended questions. The Likert items asked the participants to rate their opinions of the effectiveness of LLP Technology in the participants' learning environment. Certain questions differed from those in the Ryba et al. (2004) study due to the focused nature of the investigation. Some of the questions were reversed and contained negative statements so as to protect against response bias where subjects choose the same response for each item (Tuckman 1978:220-221).

The questions were categorized as follows: retained; course-related; emergent. While retaining some questions from the Ryba et al. (2004) study (retained), some additional questions were prepared that related to elements taught during the five-week course (course-related).

Finally, specific questions were included about points that emerged during the five weeks in student emails and in the protocol interviews (emergent).

The researcher presented the questionnaire to the participants at the completion of the course. The origin of each question was coded as: retained; course-related; or emergent. The questions and respective origins are shown in table 5.4 below:

Table 5.4 The origin of the questionnaire items

Q1. LLP helps me to understand lectures	course-related
Q 2. LLP helps me to take more detailed notes	course-related
Q 3. LLP helps me to understand words such as way, approach etc.	course-related (signaling words)
Q 4. I find it difficult to look for and find words on the screen	emergent-(reversed)
Q 5. LLP helps me to concentrate even when I do not understand	-course-related
Q 6. I feel relaxed when I can read what I hear on-screen	course-related
Q 7. LLP helps me to recognize familiar words-	emergent
Q 8. I find it difficult to think about meaning when I listen and look at the screen	emergent (reversed)
Q 9. LLP helps me to recognize discourse markers	course-related
Q 10. LLP helps me to learn new words	emergent
Q 11. LLP helps me to know if lecture information is important to note or not	course-related
Q 12. LLP helps me to take more notes	course-related
Q 13. I would like to have LLP in my other classes	retained
Q 14. LLP helps me to understand intonation when the teacher is introducing a new topic-	course-related
Q 15. Looking at the screen helps me to understand my listening problems	emergent
Q 16. LLP helps me to understand the meaning of words and phrases	course-related
Q 17. The words appear on the screen too slowly for me	emergent-(reversed)
Q 18. LLP helps me to guess the meaning of words and phrases I do not know	course-related
Q 19. LLP helps me to build knowledge of a lecture topic	course-related
Q 20. Sometimes I do not know if the words on the screen are correct	emergent-(reversed)
Q 21. I prefer to listen to lectures with the help of LLP	retained
Q 22. LLP helps me to improve my spelling	emergent
Q 23. LLP helps me to be a confident listener	emergent
Q 24. LLP helps me to imagine the message in the lecture	emergent
Q 25. How much time do students spend looking at the screen? 30%, 40%, 50%, 60%, 70%, 90%	course-related
Q 26. What do you think are the main advantages to the Liberated learning system?	retained
Q 27. What do you think are the biggest problems with using the Liberated Learning system?	retained
Q 28. Is there anything that you think can be improved?	retained

5.3.2 Protocol Analysis

The researcher interviewed the participants twice: once pre-course and again after the course. The participants were asked to verbalize problems and solutions as they took notes and these verbalizations were recorded. This interview method is referred to as verbal protocol analysis or VPA. This is essentially a 'think aloud' procedure involving subjects in the verbalization of their thoughts while making decisions or judgements (Barber & Roehling 1993:845). The theory that underpins verbal protocol analysis is that behaviours can be observed that can accurately highlight the underlying cognitive processes of subjects (Barber & Roehling 1993:848). VPAs can do the following:

1. provide evidence of strategy use
2. investigate strategy use in an unobtrusive fashion
3. decrease the possibility that research avenues may be closed off
4. provide rich detailed data and can generate research questions (Barber & Roehling 1993:847-848).

VPAs can replace interviews and questionnaires and can be employed pre- and post- course (Cacioppo et al. 1997:929). They can also be used as a diagnostic tool to give information about strategies and comprehension processes and to identify where comprehension breakdowns occurred and what caused them (Laing & Kamhi 2002:442). In this investigation, VPAs were employed to bridge quantitative and qualitative methods of research (Midanik et al. 1999:676).

The researcher realised that participants did not constitute a homogeneous group of learners in so far as they varied in the extent to which they could accurately and fluently verbalise their actions and in how much they understood.

At the outset of the interview, the participants were given practice tasks to relax them into the main task and to get them used to being tape-recorded (Weidenbeck et al. 1989:25). The warm-up tasks consisted of mental addition tasks that challenged the participants listening comprehension at three stages: perception, parsing, and utilisation. For example, participants were asked to add 1+1. At this lowest level of comprehension – perception - participants could recognize the familiar words one and one. Then, participants were asked to explain how they arrived at the answer. Subsequently, the following arithmetic problem was given to the participants: a man had 100 dollars in his wallet before he bought a shirt costing 35 dollars, a pair of pants costing 22 dollars and 80 cents, and finally a pair of socks costing 11 dollars. Immediately following the description of the problem, the participants were asked to tell me how much the man had in his wallet leaving the shop. Thus, the participant was required to parse the language and understand the background topic i.e. shopping. To be successful, the participants had to understand and remember the prices and then do a subtraction sum. If they had problems with this task, they were asked to 'think aloud' and verbalise the problem. Sometimes, however, the researcher had to prompt the participant with a question.

Following Nunan (1996:124), it was important not to provide leading questions, and the researcher used the three questions below alternately throughout the interviews. According to Weidenbeck et al. (1989:25), if a participant stops talking, one could say "If you keep talking, I won't interrupt". However, as an alternative, Weidenbeck et al. (1989:25) was expanded upon to include the following questions:

1. Do you have a problem?
2. What are you thinking?
3. How does this listening compare with listening one?

The researcher also gave constant encouragement to the participants to keep talking by saying "tell me more". The interaction began when and if the participant paused after the researcher had read some information from the lecture text. At that point, the researcher asked the student one of the aforementioned questions. If any participants misunderstood, the process was explained again to give them confidence to 'think-aloud' (Green & Gilhooly 1996:58).

The recorded interview was as follows:

1. the researcher gave the participant a notetaking framework;
2. the researcher delivered a lecture (listening one) to the participant without LLP and the participant took notes on the framework;
3. the researcher paused after reading each chunk of information and waited for the participant to verbalize problems or tactics and strategies. If there was no response, the researcher tried to elicit one;
4. the researcher delivered the same lecture again with the support of LLP and the participant took notes again as per listening one;

5. the researcher paused after reading each chunk of information and waited for the participant to verbalize problems or tactics and strategies. If there was no response the researcher tried to elicit one.

Each interview lasted approximately two hours on university premises in university time. Each participant's verbalization was recorded on a tape-recorder and a coding system was developed to match participants' verbalizations to strategies by using listening strategies listed in Goh (2000) (see Appendix J).

Subsequently, the protocols were transcribed, segmented into informational units. At this stage the researcher employed cognitive tactic a., metacognitive tactics h.,i., and k. as well as socio-affective tactics a. and b. from Goh's (2000) list in appendix J to match the informational students to tactics in the protocols. The researcher then encoded the matched tactics in the informational units into strategies where possible (see appendix K) (Green & Gilhooly 1996:63). An informational unit is the smallest unit of meaning that undergirds the surface structure of a text (Coderre et al. 2003:697). In addition to Goh's strategy list, any emergent strategies that resulted from exposure to the digitised text were encoded (Green & Gilhooly 1996:60-61). Strategy use was calculated by categorising and counting strategies which were then recorded in number form on table 6.5. This table is shown in the results chapter 6 (Laing & Kamhi 2002:439).

5.3.3 Email discussions

The researcher invited the participants to engage in email discussions. He began the discussions by posting the following three questions:

Q.1 What are the advantages of the Liberated Learning Technology?

Q.2 What are some problems with the Liberated Learning System?

Q.3 What improvements to the system would you like to see?

These questions were sent to the participants each week for five weeks. The replies were then collated and email responses were analysed for the total period of five weeks.

5.3.4 Academic listening and notetaking course

The LLP Technology-supported academic listening course lasted five weeks. The content consisted of selected textbook lectures that were read to the participants. The overall aim of the course was to better prepare the subjects for listening to lectures. This course contained five lectures on the following subjects that are related to general psychology: nicotine addiction; memory; sleep; and anxiety parts one and two. Memory was taken from an EAP textbook called *Focus on IELTS* (O'Connell 2002) . The other lectures were adapted from an EAP textbook called *Quest* (Blass 2001). Each session lasted approximately one hour and followed a similar format each week. The course aimed to give the participants experience at using the digitised text and to improve their academic listening comprehension and listening strategy use.

With these aims in mind, the teacher used the digitised text to point out the following elements of lecture discourse structure:

- discourse markers and intonation;
- informational units ; and,
- signaling words such as *way, approach.*

In addition, the teacher tried to make the participants aware of listening strategies by asking the following questions to raise strategy awareness.

1. Is this information important?
2. What will come next? Or what am I going to say next?
3. How do you know?
4. What does this word mean? (Lebauer 1984:52)

The teacher guided the subjects through the following two stages of strategy training using LLP Technology (Dhieb-Henia 2003:396):

1. the participants would assimilate and store facts about strategies in relation to recognition of lecture discourse elements; and,
2. strategies would be retrieved and used to guide behaviour in the recognition of discourse elements during protocol analysis interviews post-course.

Course Format

The course format included a lecture read twice to the participants once without, and once with, the support of LLP Technology. The participants listened to the lecture and took notes on a three column by two row notetaking framework. The notetaking framework was adapted for this function, having originally been employed as a learning aid for reading skills for L2 students devised at Massey University Students' Learning Centre.

Topics and sub-topics	Key information	Additional information

(See completed example in Appendix D)

When the first lecture ended, the researcher collected the participants' notes. The participants then listened to a three-minute long sample of rap music as an interlude to diminish any potential practice effect. The teacher then delivered the same lecture with the support of LLP Technology. The participants took notes and when the lecture ended, the researcher again collected the participants' notes. Finally, the teacher taught elements of the lecture discourse and strategy awareness (Lebauer 1984:51) using LLP Technology. The course followed this format for five weeks adding up to a total of approximately five hours.

The following was the procedure for each lesson:

1. Participants listened to a mini-lecture in its entirety without LLP Technology.
2. Participants took notes. The researcher collected the notes at the end of the lecture.
3. Participants listened to a musical interlude for three minutes.
4. Participants listened to the lecture again with the support of LLP Technology.
5. Participants took notes. The researcher collected the notes at the end of the lecture.
6. The teacher highlighted elements of lecture discourse for the participants and trained them in strategy awareness.

5.3.5 Notetaking scoring method

The researcher collected the students' notetaking samples over a five-week period and analysed these for quality and accuracy of information noted including spelling, matching information and the noting of content words. This was done by matching the listening one and listening two samples against a completed notes template that had been prepared by the researcher (see Appendix I) for each lecture.

A score of one point was awarded for each accurate item of information. The participants did not need to note the information in the correct column. However, the information had to clearly show meaning.

If, for example, a participant noted a number without supporting information, it was not scored. Similarly, if a participant noted a single word which was not a topic or subtopic, it was not scored. For the purposes of this study, a lone word which was not a topic or sub-topic was considered to be both lacking detail and demonstrating a lack of adequate comprehension because of the absence of complimentary information.

The notetaking samples were initially analysed by colour coding the noted information. For example, accurate information was underlined using a red pen for topics and sub-topics, a blue pen for key information, and a green pen for additional information. When the noted information was underlined, the scores were totalled for each category and the overall sum and percentage scores were calculated.

Table 5.5 below provides an example of how the scoring was done. One point was given for topic/sub-topic, one point for each of two phobia types plus one point for each example in key information, and one point for each explanation in additional information.

The total score for the example below is a seven overall across the three categories.

Table 5.5

Notetaking sample scoring

Topics and subtopics	**Key information**	**Additional information**
Phobias=1 point	2 types: 1. social phobia=1 point e.g. agoraphobia=1 point 2. simple phobia=1 point e.g. claustrophobia=1 point	agoraphobia =fear of crowds=1 point claustrophobia=fear of enclosed places=1 point

Chapter 6

Results

Introduction

This chapter presents a detailed analysis of results for the main study. Given the small sample size, it was decided to present both individual data and a summary of results for each measure. Results are displayed as percentages for each student to reflect relative changes.

6.1 Notetaking results

The notetaking sample results in tables 6.1 to 6.6 show the correct information recorded by the participants during listening one and listening two over a five-week period. Listening one refers to a lecture delivered without the support of CSR. Listening two refers to a lecture delivered with the support of CSR. Each participant received one point for accurate information about topics, subtopics, key information, and any additional information that they noted. As already stated, the information did not need to be noted in the correct category column. The percentages of totals of notetaking scores and increases for each lecture are included in the following tables:

Table 6.1
Main study scores for Benny

listening	lecture 1	lecture 2	lecture 3	lecture 4	lecture 5
1	8.1%	8%	9%	10%	9.3%
2	10.8%	24%	39.4%	36.6%	27.9%
increase	+2.7%	+16%	+30.4%	+26.6%	+18.6%
	PE	S	S	S	S

Table 6.2
Main study scores for Resa

Listening	lecture 1	lecture 2	lecture 3	lecture 4	lecture 5
1	12.2%	18%	6.1%	1.6%	9.3%
2	9.1%	16%	15.2%	40%	25.6%
increase			+9.1%	+38.4%	+16.3%
decrease	-3.1%	-2%			
	Pm	Pm	PE	S	S

S=support PE=practice effect NA=not available NC=no change
Pm=problem

Table 6.3
Main study scores for Makiko

Listening	lecture 1	lecture 2	lecture 3	lecture 4	lecture 5
1	41.9%	32%	25.8%	45%	21%
2	50%	45.1%	39.4%	51.6%	32.7%
increase	+8.1%	+13.1%	+13.6%	+6.6%	+11.7%
	PE	S	S	PE	S

Table 6.4
Main study scores for Amber

Listening	lecture 1	lecture 2	lecture 3	lecture 4	lecture 5
1	28.4%	20%	25.8%	13.3%	24.2%
2	44.6%	34%	54.5%	48.3%	57.6%
increase	+16.2%	+14%	+28.7%	+35%	+33.4%
	S	S	S	S	S

Table 6.5
Main study scores for Stephen

Listening	lecture 1	lecture 2	lecture 3	lecture 4	lecture 5
1	absent	12%	10.6%	6.7%	7%
2	absent	12%	12.5%	36.7%	21%
increase	0%	0%	+1.9%	+30%	+14%
	NA	NC	PE	S	S

Table 6.6
Main study scores for Arina

Listening	lecture 1	lecture 2	lecture 3	lecture 4	lecture 5
1	28.4%	26%	27.3%	35%	32.5%
2	33.85%	38%	31.8%	51.6%	32.5%
increase	+5.4%	+12%	+4.5%	+16.6%	0%
	PE	S	PE	S	NC

Tables 6.1 to 6.6 compare the results of listening one with the results of listening two (see appendix M for raw data). The listening two responses were coded as: S for support , PE for practice effect, NC for no change, and Pm for problem. The highest percentage of correct notes taken by one participant in the practice effect study was 10.8%. Accordingly, the expected practice effect baseline was set at 11% above which any score would be attributed to the support of LLP Technology. 'Support' refers to any increase in the percentage of correct notes taken by the participants which scores above the baseline practice effect percentage of 11% with the aid of LLP Technology. 'Practice effect' refers to any increase scored below 11% the baseline percentage. 'No change' refers to participants having scored the same percentage of correct notes in listening one and listening two. 'Problem' means that the student scored less in listening two than in listening one. The scores between 20-40% of accurate lecture notes recorded are dependent for their importance on Kiewra's (2002:72) finding that generally L1 students note between 20-40% of information in a lecture.

Kiewra's finding is important to this study because generally the L2 participants would be expected to record less information than L1 students normally.

A comparison of listening one and listening two across the lectures indicated a large range of variation between students. Notably, the majority of students did not achieve immediate gains with the support of LLP, but did so over subsequent lectures. For example, table 6.1 shows the gains made by Benny. In lecture one, he scored a small increase of less than 11%. In lectures two and five, he scored just over 11%. In lectures three and four, Benny scored significant increases over 11%. Overall, during listening two Benny scored in excess of the practice effect baseline in four out of five lectures. This student showed a substantial increase within the range of 20-40 percent in lectures two, three, four, and five with the support of LLP.

Resa's scores are shown in table 6.2. In lectures one and two, she decreased her scores by noting less lecture information during listening two. In lecture three, she scored just under 11%. In lecture four, she scored a significant increase over 11%. Finally, in lecture five she scored just over 11%. Resa scored within the 20-40% in lectures four and five with the support of LLP.

Table 6.3 shows the scores for Makiko. She scored less than 11% in lectures one and four. In lectures two, three and five, Makiko noted slightly more than 11%. Makiko also scored consistently within the 20-40% parameter in both listenings in all lectures. She scored over 50% in lecture four with the support of LLP.

Table 6.4 displays Amber's scores. She scored just over 11% in lectures one and two. In lectures three, four and five, Amber recorded significant increases over 11%. She is the only student to have increased her notetaking score consistently over the five lectures. Amber scored within the 20-40% parameter in lectures one, two, three, and five during listening one. She scored over the 20-40% parameter in lectures one, three, four, and five during listening two.

Stephen was absent for lecture one. As table 6.5 shows, he scored exactly the same for listening one as for listening two in lecture two. In lecture three, he scored a small increase. His score increased significantly over 11% in lecture four. In lecture five, he scored slightly above 11%. Stephen scored within the 20-40% parameter in lectures four and five during listening two with the support of CSR.

Table 6.6 shows that Arina scored small increases under 11% in lectures one and three. In lectures two and four, she scored just over 11% by one point and five and a half points respectively. Her score stayed the same in lecture five. Arina also scored consistently within the 20-40% parameter in all listenings in the five lectures. She scored over 50% in lecture four during listening two.

Overall, four out of six participants showed a pattern of increased listening scores with the support of LLP over the 11% parameter. The other two participants scored inconsistently over the five lectures. On average, *support* accounted for 60% of listening two scores; *practice effect* made up 26.6% of listening two scores; *no change* accounted for 10% of listening two scores; *problem* made up 3.3% of listening two scores.

Table 6.7 shows participants' average scores in notetaking for listening one and listening two for all five lectures. As can be seen, the average increases for listening two were larger than the baseline practice effect score for four out of the six participants. On the other hand, Makiko and Arina both scored average increases below 11%. Also, Resa and Stephen scored only marginally above the 11% level. Significant increases are shown in table 6.7 for Benny and Amber only.

Table 6.7
Main study average scores

Listening	Benny	Resa	Makiko	Amber	Stephen	Arina
1	8.9%	9.4%	33.1%	22.3%	9.1%	29.8%
2	27.7%	21.2%	43.8%	47.8%	20.6%	37.5%
increase	18.8%	11.8%	10.7%	25.5%	11.5%	7.7%

Notetaking samples were also scored for 'logical connective relationships' or matches across the three columns of topic/sub-topic, key information, and additional information. The following notetaking framework from lecture four on *Anxiety* is an example of how matching can work:

Topics and subtopics	**Key information**	**Additional information**
Phobias	2 types: 1. social phobia e.g. agoraphobia 2. simple phobia e.g. claustrophobia	agoraphobia =fear of crowds claustrophobia=fear of enclosed places

For the purposes of this study a match is considered to be an example of more complete comprehension of a topic or sub-topic. In the above example, the sub-topic is phobias and the key and additional information columns contain notes about that sub-topic. If a student noted information about a topic or sub-topic in any two of the above categories, this was scored as a match.

In addition to matches, improved spelling was scored. If a student spelled a word wrongly during listening one, but correctly during listening two, he/she was given a score of one point for each correct spelling. Finally, if a student noted content words or phrases in listening two not noted during listening one, they were given an additional one point for each word or phrase.

Table 6.8 displays the number of participants' matches, corrected spellings, missed spellings, and newly noted words and phrases. Results for individual students can be summarized as follows:

Benny noted 18 matches more with the support of LLP. He corrected seven spellings, but missed ten incorrect spellings with LLP support. He noted a total of 30 words and 16 phrases.

Makiko noted 20 matches more in total with the support of LLP. She corrected 24 spellings, but missed 35 incorrect spellings with LLP support. She noted a total of 7 words and 17 phrases.

Amber noted 14 matches more in total with the support of LLP. She corrected 18 spellings with the support of LLP, but missed 12 incorrect spellings. She noted 34 words and 12 phrases with the support of LLP.

Arina noted 11 matches more in total with the support of LLP. She corrected 16 spellings, but missed 35 incorrect spellings with LLP support. She noted a total of 7 words and 15 phrases with the support of LLP.

Stephen noted 9 matches more in total with the support of LLP. He corrected 7 spellings with the support of LLP, but missed 11 incorrect spellings. He noted a total of 16 words and 11 phrases with the support of LLP.

Resa noted 8 matches more in total with the support of LLP. She corrected 14 spellings with the support of LLP, but missed one incorrect spelling. She noted a total of 23 words and 24 phrases with the support of LLP.

Table 6.8

Main study total scores for matches, spelling, and improved vocabulary and phrases

name	match				spelling		vocabulary and phrases
	US	LLP	CH	WR	LLP	CH	
Arina	25	36	+11	51	+16	-35	+7 words +15 phrases
Stephen	6	15	+9	18	+7	-11	+16 words + 11 phrases
Amber	24	38	+14	30	+18	-12	+34 words +12 phrases
Makiko	36	56	+20	59	+24	-35	+7 words +17 phrases
Resa	8	16	+8	15	+14	-1	+23 words + 24 words
Benny	8	26	+18	17	+7	-10	+30 words +16 phrases
Mean	17.8	31.2	+13.3	31.6	+14.3	-17.3	+19.5 words +15.8 phrases

US=unsupported by LLP LLP=supported by LLP WR =wrong CH = change affected by LLP

CSR support resulted in a substantial increase in the average number of matches recorded by the participants and this may indicate improved comprehension. In addition, the system supported the noting of an average of 19.5 words and 15.8 phrases. This demonstrates the potential of CSR to support L2 students recording of lecture words and phrases for post-lecture clarification. On the other hand, spelling errors were repeated during listening two at an average of –17.3 spellings. This is important because intuitively one would expect that spelling would improve with the support of on-screen text.

6.2 Email responses

The participants were emailed the following three questions each week for a total of five weeks:

Q1. What are the advantages of the Liberated Learning Technology?

Q2. What are some problems with the liberated Learning System?

Q3. What improvements to the course would you like to see?

Tables 6.9A, B ,and C below contain the participants' email responses

Table 6.9A

Question 1. What are the advantages of Liberated Learning Technology?

Arina	In my opinion this new method could be quite useful for students at the first stages of learning English. As you know there are a lot of words in English language which their sounds are the same but different in speling so when students can see the words that helps them to write the words correctly. Therefore they can understand the content
	Understanding contents on the right meaning
	Any country has their own accent so a student who try to learning English has to hear all accents just one thing could help s/he "SPELING" therefore listening while you can see is the best idea
	Lecture 4 was very beter than lecture 1 because you tried read more slowly and we could consentrate more on screan and finding head topics
	I think the get on with this technology take more time. Overall it was great and much helpful in understanding the contents.

Stephen	I heard a word &quotphobia from tv3 news just before last Friday we had frequently heard phobia and I could know this meaning its help me to understand news
Benny	I think it can help us easy to understand the meaning about the lecture and correct some spelling or granmar mistakes
	I think I am trying to adapt the technology, which gave me more help to understand the lectures, so, I understood why we need listen the lecture two times, firstly we guset the meaning use our brain, secondly, we get some help from technology, that good!
Makiko	When students lost a lecture, they can follow or check easily and are able to check spelling
	I can follow or check the lecture
Amber	I think your class give me many help on my listening skill, using the technology is good, which can help us to realise what the lecture talk about
	I was very enjoy your class, those make me feel comfortable, I think is very important when I study something . during your lessons, the first times lisening. Because some words I always speak in the wrong way, so when I heard them I cannot recogenize them. for example:anxiety secondly, I can learn some useful information and new words in your class. about IELTS, it is quite useful for section 4, because in this part I summary the information I heard. you lecture help me to understand the lecture well. then easy to summary and you teach us to divide the article into different part, tell us what is topic , what are key information, which also can help us understand the lecture.

To question one, Arina responded twice that LLP could improve spelling, once that it could improve comprehension and once that it could help to highlight topics. Makiko responded twice that LLP could help students to regain understanding of a lecture if they lose their way and once that it could improve spelling. Benny responded twice that LLP could improve listening comprehension, once that it could improve spelling, once that it could improve strategy use and once that it gave listening support. Amber responded once that LLP could improve listening skills, once that it could improve comprehension especially the recognition of familiar words that she mispronounced and as a result did not recognize during listening one. She responded once that LLP could improve affective learning, once that it could help her practice for the IELTS listening test, and once that it could improve knowledge of vocabulary. Stephen responded that learning of vocabulary with the support of LLP led to transfer of learning for him because he heard a word on TV that he had first recognised during listening two.

Overall, the participants' responses to question one stated that LLP Technology had a positive effect on listening comprehension especially at the level of perception, notetaking skills, strategy use and affective strategies. In addition, participants responded that CSR helped to highlight topics, support knowledge of vocabulary, and generate transfer of learning. Stephen told how he heard the nonsense word &quotphobia on the TV. Although the word is nonsensical, it represents transfer of learning in the respect that phobia had been a key word in lecture four.

Table 6.9B

Question 2. What are some of the problems with the Liberated Learning System?

Arina	Personally I never had use this method I could not consentrate on my writing in contrast I understood more about subject. Some words were written on the wrong style at the second listening and it is a little complicated to understand content properly
	In orther to sumerising contents we have to omit ditailes but lecture 4 without examples was nearly imposible to writing notes so in this case we have to more focuse on detailes and write them down so it could be time consuming and we could not write all main points but personally I found out the context better. lecture 4
Makiko	When students want to check some informations during listening, they can lose the lecture very easily and it very difficult to follow the lecture, because students have to look for the word where it was
	Wrong words but it was much better than last one
Benny	But sometime it also give you some wrong answer and the machine spent a long time on processing, because the speed of the voice spoken and the speed of the word displayed are not the same time , so we felt a little be maze when we were looking the CRT and listening the voice!
Stephen	It was difficult for me because I need more time to think & write I wasn't listen to sentence when I was writing and I have to think of spell in case of my own language I can do both of them, listening, thinking, writing
Amber	No response

To question two, Arina responded once that the accuracy of the LLP System was a problem for her and once that she had problems taking notes. Makiko responded that the accuracy of the LLP System posed a problem. Benny also responded that the accuracy of the LLP System was problematic. He also responded that the processing time of the word recognition was too slow which led to a perception that the digitised text appeared late on the screen. Stephen responded that he did not have enough time to think about spelling and writing during listening two and that he could not listen and write at the same time.

Three participants responded to question two that the accuracy of the on-screen text needed to be addressed to improve the effectiveness of the LLP System. Other problems included the speech recognition processing time, participants processing time and notetaking.

Table 6.9c

Question 3. What improvements to the course would you like to see?

Arina	Reading slower. Because we are still begineer in this method.
Makiko	Correct the words
	Something bullet point or teacher pause some stages to make blank. For example, the teacher write or put some mark or symble on the screen each subject or main point because students will be easy to follow the lecture
Benny	I wish the machine can process the answer as quickly and clearly as possible
Amber	No response
Stephen	No response

To question three, Arina again responded that the technology would be more effective if the teacher read the lecture more slowly. Makiko responded that accuracy needed to be improved and that teaching would be more effective if the teacher highlighted important points on the screen during lecture two. Benny responded that the processing time of the machine should be speeded up.

In sum, the participants responded to question three that improvements to the LLP System should include slower lecture readings, increased accuracy of word recognition, a tracking device for the on-screen text, and faster text processing time.

A delimitation of this study was that beginning in lecture three, a pause was introduced after an informational unit was read. This was in response to Arina's email request for a slower reading.

6.3 Protocol Analysis

This section contains the results of the effect of CSR on strategies as found through verbal protocol analysis. The researcher interviewed the participants at a pre-lecture and post-lecture research stage. He analysed the 'think aloud' data by matching a listening strategy to each response from those strategies listed in Goh (2000) (see Appendix J) and outlined in chapter two. The data showed a commonality across student responses in the incidence of CSR support. The main finding was that the participants metacognitively evaluated listening weaknesses in the first unsupported lecture and commented on how CSR helped them to better understand lecture content. Responses of this kind were coined by the researcher as 'support and evaluate'.

The following are two examples from protocol one listening one and protocol one listening two of how CSR can support listening comprehension in listening two:

<u>protocol one listening one</u> *strategy*

22 "Mm you mean in developing country they use glue and because its cheaper and

23. available and use from the plastic bag? - *paraphrase*

24. I didn't understand" *monitor*

protocol one listening two

40. "Now I understand and the children sneef (sniff) it from the plastic bag I misunderstanded

41. sneef and I suppose that something they mixed with the plastic bag and they use the

42. drug that contain the plastic bag but oh now I can imagine the sneef on the plastic bag

43. and now I understand better ok"- *support and evaluate*

In protocol one, the student could not understand the main point of the listening input. The participant tried to build meaning around the words she heard by using background knowledge related to the key word *glue*. She realized during the second listening that she had missed other key words in the first lecture and thus she evaluated the first listening. As a result, she had an opportunity to practice using the metacognitive strategy of evaluation and consequently, she understood the main points of the information. This participant described how CSR gave support that made comprehension more complete. For instance , in the above example, the LLP System supported understanding of one word that in turn increased comprehension of the informational unit in which it was contained.

A detailed analysis of individual participant protocols is presented below. This is followed by a summary of strategies used by the participants (6.10)

Arina protocol one listening two

In the protocol one listening two interview, 11 support and evaluate strategies were recorded for Arina. The following are examples:

71. "oh spirit world I suppose scurit word first time"- *support and evaluate*

The participant understood a familiar word with the support of CSR that she had misheard during the first lecture.

73. "Widely .. widely used ah now I understand mm
74. The first time the first reading I couldn't understand (god's?) meaning what you mean
75. about this sentence have been widely I heard wildly not widely and used to help and
76. widelys totally changed the meaning of the sentence now I saw the widely --oh used to
77. help people communicate with the spirit world so because of this like this like this
78. word another meaning I suppose totally different" *support and evaluate*

This participant described again how CSR supported listening improved the recognition of familiar words at the level of perceptual understanding which in turn improved comprehension of informational units.

Arina protocol two listening two

There were 41 support and evaluation strategies recorded during the post-course interview for Arina.

The following are examples of these strategies:

21. "Carcinogens ah ok I understand now cos of the spelling/ its familiar I already look at it"- *support and evaluate*

Arina recognized a familiar word *carcinogens* with the help of CSR.

43. "oh now I understand it (putting pieces together to form whole) yeah because the cilia
44. destroyed tar causing to coughing yeah/now I understand/because the explanation
45. more complete and I can see"- *support and evaluate*

She described how CSR supported second listening supplemented a first listening by making comprehension more complete.

84. "Mainstream I couldn't understand this word mainstream and now I understand it
85. mainstream because of the spelling/blown out by (?) and side strem sidee ah
86. mainstream sidestream now I understand it-
87. The first time I couldn't understand what you are talking about passive smoking but
88. the variety of passive smoker is the point "- *support and evaluate*

Her comprehension of key words improved with CSR support. She went on to say that the comprehension of these key words supported more complete comprehension of the information.

91. "Ah harmful ingredient I couldn't understand the first time and now ingredient
92. harmful ingredient now I understand what's the meaning of this sentence"-

support and evaluate

She described how CSR supported listening improved the recognition of familiar words which were missed during listening one.

95. "Oh annually I hear diannury and now (di?)annually I know it"-

support and evaluate

She described how CSR-supported listening improved the recognition of familiar words misheard during listening one.

98. "Ah I didn't understand the last sentence and now I understand it (twice as likely)-
99. Children of cigarette smokers-oh this is very important subject-
100. nearly twice twice I couldn't understand it
101. now exactly understand it
102. this is compare compiration (comparison) its very useful to see this than and twice than"- *support and evaluate*

She commented how CSR-supported listening improved listening for informational units that were difficult to parse. She recognised individual words, but not in syntactical sequence. However, with the support of CSR, she could organize the words syntactically in short-term memory to derive meaning. She also assessed the importance of understanding this information with the support of LLP Technology.

111. "an allergy/I just realize the allergy in this sentence about affect the pregnancy mum
112. allergies (?) yes when they deliver the baby it can have allergy and yes mental
113. problem affect of cigarette"- *support and evaluate*

She verbalised how CSR-supported recognition of a single word could activate background information to make meaning more complete. In this instance, the recognition of one word led to more complete understanding of an informational unit.

The main difference between interview one and interview two for Arina was the increase in strategies recorded for protocol two listening two.

Benny protocol one listening two

Two support and evaluate strategies were recorded for Benny during protocol one. These were:

65. "yeah it can help me to understand this sentence" *support and evaluate*

Benny recognized the benefit of having the support of CSR to comprehend an informational unit.

70. "when I saw the monit moniture it can help understand this sentence that's good" *support and evaluate*

Again he recognized the benefit of having CSR support to comprehend an informational unit.

Benny protocol two listening two

Eight support and evaluate strategies were recorded for Benny during protocol two. These were:

10. "Yeah before that I don't know so now I understand because I see the monitor" *support and evaluate*

He compared the first listening with the second listening for quality of comprehension.

15. "the monitor I saw some words I know so I can understand" *support and evaluate*

He acknowledged the ability of CSR to support word recognition

27. "saw last sentence they tell me what's this caused some sick about lung so I can guess what's this things" *support and evaluate*

He connected parts of the lecture and shows an awareness of strategy use (guessing) with the support of CSR.

51. "I can easy to understand when I saw the maniter the monitor *support and evaluate*

He acknowledged the support of CSR in enhancing his ability to understand.

54. "Yeah first listening now I can guessed when I saw the monitored yeah because I still have some word I don't understand but I can guessed" *support and evaluate*

He showed an awareness of strategy use (guessing) with the support of CSR.

67. "The first time I hear the listening I could not catched now ah I know I saw the word and I can ask the teacher what's the meaning about this word" *support and evaluate*

He compared the quality of word recognition in listening one with listening two and then showed an awareness of the need to use a socio-affective strategy: asking for clarification.

77. "Oh so I think this can .. when I saw the moniture I think this can help me understand clearly" *support and evaluate*

He recognized the ability of CSR support to make comprehension more complete.

92. "The first time I know this sentence meaning now when I saw the moniture this more clearly than the first time" *support and evaluate*

He compared listening one with listening two and recognized the ability of CSR to support listening comprehension.

<u>Makiko protocol one listening two</u>

Five support and evaluation strategies were recorded for Makiko during protocol one. These were:

6. "Mm I can follow cos you said twice and I can see I cannot fo..look for a word before so I have to guess and I have to search in my brain but now I can see" *support and evaluate*

Makiko recognized how CSR support generated faster processing by saving the student from having to search in long-term memory for a familiar word.

10. "Oh I can fix my vocabulary because I can see" *support and evaluate*

She recognized the ability of CSR to support spelling correction.

35. "So I realize now" *support and evaluate*

She understood with CSR support

45. "Mushrooms is easy word but if I have to write its quite long word but I can check" support and evaluate

She realized that she could check her spelling with the support of CSR

46. "This right word indigenous? I thought business people" *support and evaluate*

She recognized a word with the support of LLP Technology that she misheard in the first listening.

Makiko protocol two listening two

Seven support and evaluation strategies were recorded for Makiko during protocol two. These were:

50. "it will help very much because I can write everything so I can write I can think later I can sum up later" *support and evaluate*

CSR supported Makiko's 'tape-recorder-like' notetaking style.

71. "Mmh very easy to understand I can read more detail cos listening cos I can follow the word its much better than first one" *support and evaluate*

She compared quality of comprehension in listening one with that in listening two and recognized the potential of CSR to increase comprehension of detailed information.

80. "perfect I can make perfect lecture notes even I don't understand the lecture but I can understand later its very perfect lecture" *support and evaluate*

She recognized the ability of CSR to support detailed notetaking.

82. "Oh I was wrong the first lecture" *support and evaluate*

CSR supported Makiko's strategy awareness as she evaluated her comprehension of a lecture during the first listening.

85. "I can write more detail about the passive smoke contain so really helpful if I read later" *support and evaluate*

She again recognized the ability of CSR to support detailed notetaking.

86. "I couldn't catch before because I can read and I remember this part I couldn't catch but I can read now" *support and evaluate*

She evaluated her non-comprehension of a lecture segment during listening one and recognized the potential of CSR to support comprehension of the same segment.

93. "If I have (?) time I can read (?) but the second time is more detailed than first one" *support and evaluate*

Again, she acknowledged the potential of CSR to support comprehension of detailed information.

Amber protocol one listening two

Six support and evaluate strategies were recorded for Amber during protocol one. These examples are as follows:

19. "Hmm sometime I cannot concentrate so I think that it is good" *support and evaluate*

Amber recognized that CSR support helped her to concentrate whilst listening to lectures.

20. "I can see the word on the computer for example increase the production by 6%
21. I only know 6% I cant catch increase" *support and evaluate*

Amber gave an example of how CSR supported the recognition of words that she failed to hear during the first lecture leading to more complete understanding.

31. "I think this private
32. Previous – I think sometimes it can help me" *support and evaluate*

CSR aided comprehension of a word previously misheard.

44. "Some word maybe its not difficult but I cannot recognize when I saw it –oh its this one" *support and evaluate*

She became aware of an unfamiliar word with CSR support.

55. "mumbles-this just because I don't know this word when I listen a lecture I always feel

56. that I need to know word"

57. "this so it can help me I can just copy this word and use dictionary"

support and evaluate

She described how CSR helped her to note unfamiliar words that she could look up at a later time.

69. "this time second time so I can more relax and I can fell (feel) more ...

70. also I don't know exactly word second time is ok" *support and evaluate*

She recognized how LLP Technology enhanced her awareness of affective strategies.

Amber protocol two listening two

Seven support and evaluate strategies were recorded for Amber during protocol two. These are as follows:

16. "Ok before this sentence I know nothing at all now maybe a little but still many word I cannot understand what that means exactly" *support and evaluate*

Amber described how CSR improved comprehension to some degree.

23. "That's ok/ before I don't know the resparatory (respiratory) but now I can recognize this word

24. so I can write very easily think about how to say" (laughs) *support and evaluate*

She described how CSR helped her to recognize familiar words

25. "*Chronic* just one word I don't know the means now I can understand mm so its no problem for these sentence I can understand" *support and evaluate*

She described how guessing the meaning of a word with CSR support aided comprehension of informational units.

46. "this time I miss X because I focus too much on fat but I have this machine to help me is good" *support and evaluate*

She missed listening input because she became fixated on one word; however, CSR supported her comprehension of missed input and made her aware of her listening problem.

55. "mmh oh the second one is more easy because its side strain smoke"

support and evaluate

She understood a word with the support of CSR.

74. "I mean when I finish listening I go back to my notes I cannot remember what this word if I don't have the machine to help me to write the word correctly*support and evaluate*

She described how CSR improved the accuracy of notetaking allowing her to review vocabulary when the lecture has finished.

99. "you use it its very good I like this very much because it can help me"-

support and evaluate

She acknowledged the general listening comprehension support that CSR can give her.

Stephen protocol interviews

Two support and evaluate strategies were recorded for Stephen during protocol one and five support and evaluate strategies were recorded for Stephen during protocol two. Examples are:

54."The sentence is not fast and I have to remember same time I have to read so not clear but more than first time" *support and evaluate*

In this example, Stephen describes how CSR can help to improve his comprehension. He found it challenging, but he recognised some improvement.

21."How can act in our health so I can guess first time but more understand this time"

support and evaluate

Again, Stephen states that CSR helped improve his comprehension.

Table 6.10 shows the variety of tactics and strategies used by the subjects during listening one and two during protocol one and two.

Name	Interview	Fixation	Paraphrase	Monitor	Clarification	Evaluation	Support & evaluate	Inference
Benny	P1L1	9	1	44	6	1	X	0
	P1L2	14	0	13	2	9	2	0
	P2L1	4	21	32	4	0	X	10
	P2L2	3	17	17	3	4	12	12
Makiko	P1L1	5	1	17	3	10	X	0
	P1L2	3	1	8	1	8	5	0
	P2L1	0	0	32	2	17	X	0
	P2L2	2	0	14	1	18	7	0
Amber	P1L1	0	0	8	0	9	X	0
	P1L2	16	2	24	0	7	6	0
	P2L1	1	2	44	1	11	1	0
	P2L2	1	0	9	8	24	7	0
Arina	P1L1	4	5	23	1	5	X	0
	P1L2	6	3	23	6	8	11	1
	P2L1	6	2	43	5	15	X	1
	P2L2	1	0	9	2	10	42	0
Stephen	P1L1	6	7	12	9	4	X	1
	P1L2	6	12	7	4	13	3	0
	P2L1	2	24	11	0	10	X	0
	P2L2	5	11	10	2	22	5	0

P1L1=protocol 1 lecture 1

The strategies in table 6.10 above are explained as follows:

fixation a cognitive strategy that refers to focusing on one word or phrase and missing other input;

paraphrase a socio-affective tactic that refers to describing what is understood in one's own words;

monitor a metacognitive strategy that refers to an acknowledgement made by participants of whether they understood or not;

asking for clarification a socio-affective tactic that means asking for meaning to be clarified;

evaluation a metacognitive strategy that refers to being aware of the quality of one's comprehension;

support and evaluation an emergent strategical theme that refers to judging the quality of one's comprehension and recognizing that CSR aided comprehension;

inference a cognitive strategy that refers to guessing meaning.

6.4 The effect of LLP on strategies

The following is a detailed analysis of the effect of CSR on each of the strategies listed in table 6.10. This presents the results for individual students followed by an overall summary.

Fixation

Benny used fixation 17 times during protocol one listening two. This number decreased to three during protocol two listening two. Makiko used fixation four times during protocol one and two times during protocol two.

Amber used fixation 16 times during protocol one and once during protocol two. Arina used fixation five times during protocol one and twice during protocol two. Stephen used fixation six times during protocol one listening two and fives times during protocol two listening two. The rate of usage for fixation decreased for all students with LLP support, but significantly for Benny and Amber.

Paraphrase

Benny used paraphrase twice during protocol one; however, he used it 17 times during protocol two. Makiko used paraphrase once during protocol one listening two and not at all during protocol two listening two. Amber used paraphrase twice during protocol one but she did not use it during protocol two. Arina used paraphrase twice during protocol one and not all during protocol two. Stephen used paraphrase 12 times during protocol one listening two and 11 times during protocol two listening two. The rate of usage for paraphrase increased significantly for Benny only.

Monitor

Benny used monitor 25 times during protocol one and 16 times during protocol two. Makiko used monitor eight times during protocol one and 15 times during protocol two. Amber used monitor 24 times during protocol one and nine times during protocol two. Arina used monitor 23 times during protocol one and nine times during protocol two. Stephen used monitor seven times during protocol one listening two and ten times during protocol two listening two. Makiko increased her use of monitor significantly. However, the rate of usage of monitor decreased significantly for Amber and Arina.

Clarification

Benny asked for clarification three times during protocol one and three times during protocol two. Makiko asked for clarification once during protocol one and once during protocol two. Amber did not ask for clarification during protocol one, but she asked six times during protocol two. Arina asked for clarification six times during protocol one and twice during protocol two. Stephen used this strategy four times during protocol one listening two and twice during protocol two listening two. The strategy *ask for clarification* increased for Amber.

Evaluation

Benny used evaluation ten times during protocol one and six times during protocol two. Makiko used evaluation seven times during protocol one and 16 times during protocol two. Amber used evaluation seven times during protocol one and 24 times during protocol two. Stephen used evaluation 14 times during protocol one listening two and 22 times during protocol two listening two. Arina used evaluation eight times during protocol one and 9 times during protocol two. Amber, Makiko, and Stephen increased their use of evaluation significantly. Benny decreased his use of evaluation. The effect for Arina was the same over the two protocols interviews.

Support and Evaluate

Benny used support and evaluate twice during protocol one and 12 times during protocol two. Makiko used support and evaluate six times during protocol one and seven times during protocol two.

Amber used support and evaluate seven times during protocol one and seven times during listening two protocol two. Arina used support and evaluate 11 times during protocol one and 42 times during protocol two. Stephen used support and evaluate twice during protocol one listening two and five times during protocol two listening two. The rate of usage for the emergent support and evaluation strategy increased for all students except Amber and significantly for Benny and Arina.

Inference

Benny did not use inference during protocol one, but he used it 12 times during protocol two. The other participants did not use inference at all during the protocols. Apart from Benny, CSR had little or no effect on participants' use of inference.

Summary

CSR was found to have a positive effect on strategy use overall. This is evident in two main trends: 1. the emergence of a support and evaluate strategy; and, 2. an increase in the use of the listening strategy *evaluation*. Interestingly, when Makiko and Amber increased their use of evaluation, their use of support and evaluate strategies decreased. Conversely, when Benny and Arina used support and evaluate strategies their use of evaluation decreased. Stephen increased his use of both strategies over the interview period. This points to CSR having had a positive effect on metacognitive strategies in this study.

The importance of this finding to L2 listeners generally is that CSR increased participants' awareness of their listening problems. Consequently, LLP Technology could potentially support L2 listeners to be more independent listeners through increasing their metacognitive awareness.

Problems as verbalised by the participants during interviews

The following are examples of problems that participants encountered during the interviews:

19. "I don't know this even I read this word
20. I also don't know this sentence means ..meaning"

CSR support does not always guarantee that comprehension will take place.

21. "To carry oxygen
22. Mm I feel a little bit ..yeah
23. When I hear your voice and read this I feel a little bit headache because I don't know which one is correct yeah
24. If I read the mond (monitor) I think...mm
25. Something I feel ...this correct?
26. I will mm go with this way to think about your meaning but I think this not correct yeah

This participant questioned the accuracy of the CSR system because of having had experience of previous inaccuracies generated by the system.

27. "A little bit ....
28. The first program that's very useful when I saw the mond this (points) calle mond
29. I know the meaning it can help me to understand a little bit your meaning but the second program I don't know the manage the moniture the meaning when you talking
31. so I lose my way when I saw this mond this moniture and hear your voice I lose my
32. way because I don't know I can't hear your voice and see the moniture at the same
33. time I can't think anymore you know yeah"

This participant complained about the speed of voice recognition and how a delay of a few seconds between actual speech and the appearance of digitised text made processing the text difficult to the extent that he could not think about meaning.

82. "mm yeah I can't catch the speed too quickly you know when I see moniture and hear
83. your voice I become difficult to think in my opinion so I think this is a problem
84. I could not thinking I just ....when I hear your voice and see the moniture I could not
85. thinking by myself yeah
86. I think thinking is very important because I think I don't need the program because it
87. makes me not thinking by myself and sometimes it makes me lose my way
88. Yeah I think mm just hear your voice and I can thinking that's good for me yeah"

This participant complained that processing the on-screen text impeded his ability to think about meaning.

9. "I feel why why machine cannot pick your clear voice you said 3 times but couldn't
10. pick up so I feel just not X this but I feel why"

This participant wondered why the CSR system could not recognize clear speech.

19. "Now I'm changing mind I wonder I can write from this without understanding but its
20. not correct so I still my brain is I still wonder which one I have to do which I have to choose cos I can write from this without understanding but if I choose
21. this its not correct and correct means word is not correct so i wonder in my brains I
22. have to listen or I have to write"

This participant had a dilemma. She wondered if she should listen or write because if she focused on reading and ignored listening she could note inaccurate words.

38. "Ah that I can follow many nouns but I have to search where is the word and you
39. talking its surface is going up so more difficult to find a word"

This participant found it problematic that the text kept scrolling up as she searched for a word. She complained that there was no pause in reading and that this made finding 'the word' more difficult.

24. "If I have time I can (learn?write?) but if talk all the time is very difficult to follow cos
25. the moving ...up
26. Scrolling up
27. I can't get ... the word
28. Yeah and also I don't think about anything so just disappear"

Again this is an example of a participant finding it difficult to follow a lecture and track words on-screen because the teacher did not pause during the lecture reading. This led to the eventual disappearance of the words in question from the screen.

29. "I don't think about the lecture anything at the same time I have to write everything so if the sentence gone from the screen gone I don't know what was gone too because I didn't think about anything just writing here?"

This participant's notetaking style stopped her from following the lecture because as text scrolled up information was lost. She may have overly depended on the on-screen text to the neglect of listening

23. "oh very fast –linking the drinking of alcohol-oh now I understand but I cant organize to write immediately-now I can understand but as good as be number 1 I cant organize"-

This participant had problems recording information in the notetaking framework and commented that she had had these same problems both during listening one and listening two.

32. "I can understand better but my writing I think I cant –
33. I have to- and immediately write so it would be the same same as number 1 when I focus on the screen I understand better"

This participant also found it difficult to take notes using the framework with the support of CSR. She thought that even though she understood more, she recorded the same amount of accurate notes during listening two as she had done during listening one.

35. "I forgot to write some important words I found it in there you know but now I'm better understanding the text"-

This participant forgot to write down important words even when CSR support was available.

6.5 Results of the Questionnaire

The questionnaire was administered to five students at the completion of the second interview. The remaining participant (Resa) was given the questionnaire on the last day of the lecture course. The results as described below are shown in table 6.11 for the Likert items.

All participants agreed that LLP Technology can support the comprehension of lectures. Within the area of comprehension, a majority of participants agreed that LLP Technology can support comprehension of signalling words, discourse markers, intonation, words and their meanings, and the recognition of familiar words.

A majority of participants also agreed that the technology can support notetaking. For example, all participants agreed that LLP Technology supported detailed notetaking. Five out of six participants agreed that LLP Technology supported their spelling.

Five out of six participants agreed that LLP Technology supported the taking of more notes. Four out of six participants agreed that the technology helped them to note important information.

A majority of participants agreed that LLP Technology supported their use of metacognitive and cognitive strategies. Five out of six participants agreed that the technology facilitated their understanding of listening problems as well as their ability to guess words and phrases, and visualise the message in the lectures delivered. Five out of six participants agreed that the technology facilitated the use of background knowledge to comprehend the lectures.

All participants agreed that they would like to listen to lectures with the support of LLP Technology. A majority also agreed that the technology helped them to relax and to listen with confidence. However, the participants were divided about the effect of the technology on concentration with 50% agreeing that the technology supported concentration and 50% disagreeing that it did.

With regard to problems with the technology, all participants agreed that it was not accurate enough. Two out of six participants agreed that the technology hindered their ability to think. Two out of six felt that the words appeared slowly; that is, the text did not appear quickly enough after the words were spoken.

Finally, the participants were divided about any scanning difficulties that the technology may have engendered with 50% agreeing that the technology caused scanning difficulties and 50% disagreeing that it did.

Overall, a majority of participants agreed that LLP Technology supported their listening comprehension, notetaking and use of metacognitive, cognitive and affective strategies. However, participants were divided about the effect of the technology on their ability to concentrate during the lectures. The participants agreed that there were potential problems with the technology such as inaccuracies in the digitised text. A minority agreed that the asynchronous appearance of the digitised text on the screen and the system's potential to hinder thinking were problematic. Participants were also divided as to effect of the technology on their ability to scan.

In table 6.11 below, the results of the scaled response questions are shown.

Table 6.11 Questionnaire Results (Likert items)

	strongly disagree 1	disagree 2	agree 3	strongly agree 4
1) LLP helps me to understand lectures	0	0	3	3
2) LLP helps me to take more detailed notes	0	0	2	4
3) LLP helps me to understand words such as way, approach etc.	0	1	3	2
4) I find it difficult to look for and find words on the screen	0	3	2	1
5) LLP helps me to concentrate even when I do not understand	2	1	2	1
6) I feel relaxed when I can read what I hear on-screen	0	1	2	3
7) LLP helps me to recognize familiar words	0	0	4	2
8) I find it difficult to think about meaning when I listen and look at the screen	1	3	1	1
9) LLP helps me to recognise discourse markers	0	1	3	2

10) LLP helps me to learn new words	0	1	2	3
11) LLP helps me to know if lecture information is important to note or not	0	2	3	1
12) LLP helps me to take more notes	0	1	2	3
13) I would like to have LLP in my other class	0	0	2	4
14) LLP helps me to understand intonation	0	1	3	2
15) Looking at the screen helps me to understand my listening problems	1	0	1	4
16) LLP helps me to understand the meaning of words and phrases	0	1	5	0
17) The words appear on the screen too slowly for me	0	2	3	1
18) LLP helps me to guess the meaning of words and phrases I do not know	0	0	2	4
19) LLP helps me to build knowledge of a lecture topic	0	1	4	1

20) Sometimes I do not know if the words on the screen are correct	0	0	3	3
21) I prefer to listen to lectures with the help of LLP	0	0	3	3
22) LLP helps me to improve my spelling	0	1	4	1
23) LLP helps me to be a confident listener	0	1	3	1
24) LLP helps me to imagine the message in the lecture	0	1	2	2

The following are the results for questionnaire items 25 to 28.

Q 25. How much time do students spend looking at the screen?

30%-**Amber**, 40%-**Arina**, 60%-**Stephen+Resa**, 70%-**Benny**, 90%-**Makiko.**

Q 26. What do you think are the main advantages to the Liberated learning system?

Benny-it help me understand

Makiko-I can make perfect note and can check it or read it again also I can find what I didn't understand the lecture

Amber-1. to help me to recognise the words which is important in the lecture. 2. It make me relax during the lecture

Resa-in my opinion, LLP System helped me my listening skill

Arina- spelling is the most important thing in listening so this method help us to improve our spelling knowledge

Stephen- LLP make me more clear my think and I can see text

Q 27. What do you think are the biggest problems with using the Liberated Learning system?

Benny-grammer mistakes and spelling mistakes

Makiko-incorrect words

Amber-when I use it I sometimes cannot concentrate to the teacher because I depend on it 1. sometimes I do not try to think what is teachers meaning when I heard 2. sometimes I focus too much on details

Resa-it is difficult to me at the same time looking and listening

Arina-1. machine mistakes 2. the person who read the lecture read fastly (faster than screen)

Stephen-both listening and looking at the screen I have to same time and I don't have enough time to understand – I don't know if correct word so no good to know spelling.

Q 28. Is there anything that you think can be improved?

Benny-accuracy-speed

Makiko-correct the word

Amber-1. the words can be bigger 2. the words can appear on the screen faster 3. sometimes pause to much times during the lecture is not good for me which can make me relax maybe the teacher can keep on speaking

Resa-in my opinion, it is practice so my listening was improved

Stephen-1. correct words 2. first time listening second listening third LLP .

In this section I will summarise the results attained from responses given to questions 25 to 28 of the questionnaire.

Makiko spent the most time looking at the screen and Amber spent the least. Benny focused on the screen for the next longest time followed by Stephen and Resa , and finally Arina.

The participants noted that advantages gained while using the LLP Technology included comprehension support, notetaking support, and support for the recognition of vocabulary related to the lecture. In addition, participants commented that the system aided spelling, helped them to think, and facilitated the use of comprehension evaluation.

Problems with the system as noted in comments from the participants included inaccuracies in the digitised text, dual processing of the text by reading and listening simultaneously, and the speed of lecture delivery. The asynchronous, late appearance of the digitised text may have increased cognitive load for some participants.

With regard to speed of delivery, one participant commented that he did not have enough time to process the visual and aural input.

The participants commented that the effectiveness of the technology would be increased by improving its accuracy, and increasing the speed of the synchronicity of the spoken language with the digitised text.

Summary

Results of the study can be highlighted as follows:

Notetaking: substantial increases in accuracy and completeness of information noted were evident with the support of CSR

Protocol analysis: metacognitive strategy use was found to have increased with LLP Technology. In particular, the strategy of support and evaluate allowed participants to recognise their listening problems.

Emails: LLP had a positive effect on listening comprehension. However, there were problems with accuracy, scrolling text, and processing time. As a result, participants called for improvements in accuracy, and in speed of processing time, and for some support mechanism to track words on-screen.

Questionnaire: Responses indicated that LLP supported participants' listening comprehension, notetaking, and use of metacognitive and affective listening strategies. Respondents' problems with the technology included inaccuracies, and the asynchronous appearance of digitised text.

Chapter Seven

Discussion

This chapter provides a discussion of the results using the research questions as a framework. The results are triangulated with reference to the multi-methods of data collection in order to present evidence of any effect or lack of effect of CSR concerning the questions under investigation. In addition, problems with the LLP Technology are discussed and recommendations for further research are offered. The discussion also takes account of information and data gained in both exploratory and main studies.

This investigation was carried out over the course of eight weeks during which six participants attended five lectures in a classroom setting and five out of the six participants listened to two extra lectures during protocol interviews. The participants heard each lecture two times: once without LLP support and once with LLP support. A procedure was developed to take any practice effects into consideration.

The participants recorded information during each listening on a notetaking framework containing three categories: topics and subtopics; key information; additional information. In so doing, they could not only record information in each column, but also the logical connective and interrelating categories of information (Rost in Flowerdew 1994:113).

In protocol interviews, the 'minds of the students' (Rost in Flowerdew 1994) were explored to discover how much they understood during lectures with and without LLP support and to ascertain the strategies they employed to solve listening problems. Email and questionnaire responses were used to elicit the participants' thoughts and feelings concerning the course and the technology.

Question 1. To what extent if any does LLP affect notetaking quality?

The first research question dealt with the effect of CSR on notetaking. In the exploratory study, L2 students reported a perceived beneficial effect of LLP Technology on notetaking (Ryba et al. 2004). The value of the dual-processing capability offered to the participants by LLP in the present study became evident in the notetaking results. This evidence points out that all participants have benefited to some degree from the support of LLP. For example, Makiko and Arina scored well in both listening one (without CSR) and listening two (with CSR) during the five lectures, which would indicate minimal improvement due to CSR support.

Benny and Amber, however, benefited in four out of five and five out of five lectures respectively with CSR support. Significantly, Benny, Resa, and Stephen achieved a 20%+ score in notetaking only with the support of CSR.

Resa and Stephen needed more time than the others to benefit from the technology. Indications are that participants with weaker listening skills can benefit from CSR but that they require more exposure to the medium. Overall the average scores for listening two for four of the six participants exceeded those of listening one by more than the practice effect score of 11%. One could infer from this that CSR helped participants to record better quality notes.

From the point of view of 'cognitive architecture' (Pass et al. 2003:1), it can be said that the task of understanding the high elemental interactivity in lecture informational units was made easier by germane cognitive load generated by the digitised text in CSR (Pass et al. 2003:1-2).

The notetaking benefits generated by CSR were confirmed in several of the protocols and support the notetaking data results. The participants verbalizations included comments such as "I can write more detail", "I can make perfect notes, 'I can check it or read it again", and "I can write everything". The questionnaire responses also added weight to the evidence in the notetaking data as the participants unanimously agreed that CSR helped them to take more detailed notes.

An analysis of spelling in the participants' notes produced inconsistent results. In emails and protocols, participants commented that CSR supported their spelling. For example, Makiko commented that CSR helped her to "fix her vocabulary" and Amber said that "I can just copy the word and use a dictionary".Amber commented further that "I cannot remember what this word if I don't have the machine to help me write the word".

Arina and Benny also commented in emails that CSR helped spelling. In support of these statements, five participants agreed that CSR helped them to improve their spelling, and one disagreed in questionnaire responses. However, the notetaking data reflect an anomalous situation because an average of 17.3 spellings were not recorded correctly during listening two. The reason for this may be that visual search (Kalyuga et al. 1999:353) overloaded participants' processing capabilities as they searched for correct spellings while the screen would scroll up. In spite of any processing load possibly caused by visual search, the participants did manage to correct an average of 14.3 spellings with CSR support.

In addition to spellings, LLP assisted the participants to record vocabulary and phrases. While all participants noted vocabulary and phrases related to the lecture topics, individual scores varied. Interestingly, the participants with the strongest listening skills, Arina and Makiko, noted the least words and phrases.

It could be inferred that they did not need to record them during listening two because they had recognized a majority of lecture words and phrases during listening one. Indeed, the fact that these participants scored highest in notetaking quality during listening one over the five lectures supports this supposition. Benny an intermediate level listener noted the most words and Resa a pre-intermediate level listener noted the most phrases.

Questionnaire responses indicated agreement among the participants that LLP facilitated the recording of new words.

Participants also commented negatively about CSR with regard to its effect on their notetaking. For instance, Makiko found it difficult at times to focus on a word or track its location on the screen while the text was scrolling up on-screen. Again, this appears to be a problem associated with visual search.

This problem was compounded as the words disappeared off the screen and it became impossible for Makiko to retrieve and record them. Makiko's notetaking style can be likened to that of the tape-recorder (Ryan 2001) as she liked to note every word heard and/or seen and this may have made her overly dependent on the digitised text for support. Significantly, in the questionnaire, Makiko responded that she spent 90% of lecture time looking at the screen.

Taking notes during the lectures was also challenging for Arina, although, this was not due to CSR as such. Arina stated in protocol interviews that she could not organize the lecture information into the notetaking framework categories. It can be supposed that the framework increased her processing load and constituted extraneous cognitive load for her . This is what Mayer and Moreno (2003) refer to as incidental processing. In this case, the framework is diverting short-term memory resources from the main task in order to complete a non-essential task; namely, categorizing lecture information in addition to recording lecture information.

It must be stated here that the participants were not told that correctly categorizing the information was a required task. The columns were intended to facilitate the scoring of recorded information. It seems, however, that in Arina's case the framework may have constrained her notetaking style.

In spite of any problems with the technology, the evidence seems to point to CSR having the capability to generate improvement in the participants' notetaking quality. As has been stated previously, the weaker listeners scored significant increases in accurate notetaking with CSR support. However, they also required more practical experience of using the technology. As one participant said in an email "I think the get on with this technology take more time".

Significantly, the upper-intermediate students Arina and Makiko each noted between 20-40% in five lectures during listening one while Amber achieved within that range four times during listening one without the help of CSR. According to Kiewra (2002:72), L1 students can generally record between 20-40% of total lecture information. In this context, Arina and Makiko's scores can be considered commendable achievements as they were gained without CSR support.

For the weaker listeners however, the CSR system provided the necessary support with which they could compete at some level with the stronger listeners. Accordingly, it could have potential as a teaching and learning tool in a low-ability L2 classroom context. Indeed, the evidence demonstrates that the weaker listeners in this study gained valuable support from CSR.

For example, Benny an intermediate level listener noted between 20-40% of lecture information four times with LLP support. In addition, Resa and Stephen who are pre-intermediate listeners noted between 20-40% of lecture information in two lectures with the support of CSR. None of these three participants scored within the 20-40% parameter without CSR support. Consequently, it could be said that the weaker listeners among the participants in this study received indispensable support from CSR that allowed them to compete at some level in notetaking with the stronger listeners.

Without LLP support, the weaker listeners would probably have scored below the 20-40% parameter in both listening one and listening two.

Question 2. To what extent did CSR affect listening comprehension?

In the exploratory study, two-thirds of L2 students surveyed felt that CSR aided comprehension (Ryba et al. 2004). All participants in the present study increased their number of matches during listening two (CSR) achieving scores that indicate increased comprehension resulting from CSR support. A match was described earlier in this study as an example of logical connecting and interrelated information (Rost 1994) and as such it was considered indicative of more complete comprehension for the purposes of this study. Additional information from participants in the form of emergent support and evaluate strategies via protocol interviews reinforced the notetaking data that showed increases in the number of matches recorded. These emergent strategies described how the participants' comprehension was supported by CSR.

One added advantage resulting from the use of support and evaluate strategies was the generation of metacognitive awareness of listening problems on the part of the participants.

In the exploratory study, L2 students reported a need for listening comprehension support to compensate for listening problems (Ryba et al.2004). Goh (2000) identified listening comprehension problems that appear to be characteristic of L2 listeners. In the following section, each of these problems is briefly described and they are illustrated with reference to observations and data from the present study. The following are the listening problems as presented in Goh (2000). L2 students:

1. do not recognize familiar words;
2. are slow to understand the meaning of words they know;
3. become fixated on words they do not understand and miss subsequent listening input (perception);
4. quickly forget key words and phrases (parsing);
5. can understand words, but not the message (Goh 2000:61-63);
6. miss the beginnings of the lecture and the global lecture message eludes them;
7. cannot chunk words into informational units: the corollary is that they cannot distinguish changes of emphasis of ideas;
8. concentrate too hard or they are unable to concentrate (Goh 2000:64-65);
9. cannot listen selectively to a lecture because they do not have a clear and planned purpose for listening (Goh 2000:66). As a result, they may not hear frame markers which signal lecture content.

Do not recognise familiar words

Concerning problem one, Amber commented in an email that she could not hear familiar words because she pronounced them incorrectly and that CSR could support her recognition of familiar words and thus comprehension.

The following are examples from the protocol interviews of LLP Technology support for the recognition of familiar words by the participants:

"Oh spirit world I suppose scurit word first time"

The participant recognizes *spirit world.*

"Oh annually I hear diannury and now annually I know it"

The participant recognizes *annually.*

"I think this private-previous I think sometimes it can help me"

The student recognizes *previous.*

Seven participants out of seven agreed in the questionnaire that CSR could help students to recognize familiar words.

Slow to understand the meaning of words

Problem two is exemplified in the following extract from the VPAs:

"Ah harmful ingredient I couldn't understand the first time and now ingredient harmful ingredient now I understand what's the meaning of this sentence".

In this example, the participant had heard the familiar words *harmful ingredient* during listening one, but she was slow to recognize their meaning. CSR supported her comprehension during listening two and this allowed her to understand these words. An added advantage of the LLP System as used in this study is that it made participants aware of their listening problems.

Thus this participant could (metacognitively) evaluate her comprehension and as a result, she overcame her difficulty with the help of CSR. In an email, Amber said that CSR supported her recognition of a familiar word *anxiety*. Questionnaire responses from the participants were in the majority supportive of the interview results in that they agreed that CSR had helped them to understand their listening problems.

Fixated on words they do not understand

The following is an example of problem three caused by fixation:

"This time I miss X because I focus too much on fat but I have this machine to help me"

Here the participant focused on one word causing her to miss subsequent listening input. However, she realized that the CSR display gave her the necessary support to note the missed information. Again an added advantage of this realization was that the participant became aware of her listening problems through CSR support.

Quickly forget key words and phrases

In problem four, L2 students can easily forget words and phrases in grammatically intricate informational units as shown in the following:

> children of cigarette smokers oh this is very important subject
> nearly twice twice I couldn't understand it
> now exactly understand it
> this is compare compiration (comparison) its very useful to see this than and
> twice than"

In the above example, the participant recognised the words '*children of smokers are nearly twice as likely to be ……than'* during listening one.

In spite of recognising the words, the participant found it difficult to parse (Goh 2000:71) *nearly twice as likely to be …than.* This led to comprehension breakdown on the part of the participant during listening one. The ephemeral nature of the listening process meant that words and phrases that were not parsed were forgotten as subsequent listening input arrived. The reason for this comprehension failure was the cognitive load resulting from the high elemental interactivity contained in the syntax. These interacting elements in the informational unit in question comprise the following words : *nearly; twice; as; likely; to be; than*. The participant had to store the words in STM to analyse the grammar. It was noted, however, that processing the elements in this way seemed to overload her STM. This was perhaps due to the complexity of the language and the time restriction caused by the imminent arrival of subsequent input.

CSR lessened the cognitive load for the participant above and freed up processing resources for comprehension thus allowing her to parse the words by reading the words in syntactic or grammatical sequence to get the meaning. Once again, the participant benefited metacognitively from her awareness of how to evaluate listening problems (Chamot et al.1999:159-161).

Can understand words but not the message

Problem five describes how L2 students can understand words but not the message. This is a problem at the utilization level of comprehension (Goh 2000:56-57) and the following is an example:

"an allergy/I just realize the allergy in this sentence about affect the pregnancy mm/ allergies yes when they deliver the baby it can have allergy and yes mental problem affect of cigarette"

The participant understood the words but she could not get the message in listening one. For example, she had understood allergy during listening one but could not derive the meaning of the informational unit. Subsequently with CSR support, her background knowledge about the sub-topic was activated and she understood the message.

Miss the beginnings of lectures

Problem six arises when L2 listeners miss the global lecture message. There is no evidence in the data to suggest that the participants had this particular problem during the study.

Cannot chunk words

Problem seven concerns L2 listeners who fail to divide speech into meaningful chunks or informational units. Each unit needs to be understood or else L2 listeners can lose the thread of parts of the lecture.

For example, Benny described in one interview how CSR support helped him to both recognize an informational unit and make its understanding more complete. In addition, the notetaking data concerning the number of matches that the participants noted attests to the effectiveness of LLP in this study as the participants had to record interconnecting information related to lecture topics and sub-topics, key information, and additional information.

Concentrate too hard or not enough

Problem eight describes how L2 students have problems with the metacognitive strategy of concentration when comprehension breaks down. CSR supported one participant's ability to concentrate during comprehension breakdown as the following suggests:

"hmm sometime I cannot concentrate so I think it is good"

The participant said it (the technology) was good; therefore, it can be inferred that it (the technology) increased her ability to focus on listening input.

Cannot listen selectively

Problem nine results from a lack of metacognitive strategy awareness in L2 listeners and specifically from an inability to recognise frame markers that signal lecture direction for the listener. The increase in topic and subtopics in notetaking samples may be evidence that CSR supported the ability of participants to listen for frame markers.

Question 3. To what extent did CSR have an effect on affective strategies?

An analysis of the questionnaire responses from the exploratory study (Ryba et al. 2004) confirmed some potential affective benefits of using CSR in the lecture theatre. In the main study, five participants agreed that CSR helped them to relax during listening while one person disagreed with this item. In addition, four participants agreed that CSR helped them to be confident listeners while one disagreed. Moreover, all participants responded in the questionnaire that they preferred to listen to lectures with the support of CSR. Significantly, all participants said they wanted to have CSR in their regular language classes. Finally, a majority of participants agreed that they felt comfortable when they listened to lectures with CSR support. In one interview, Amber commented that CSR made her feel comfortable during listening.

42. "I think when first you use this I feel very uncomfortable I cannot concentrate but now I think im really enjoying to use it"

This participant described how she gradually learned to get used to LLP Technology and how this improved her level of comfort.

70. this time second time so I can more relax and I can fell (feel) more...

This participant described feeling more relaxed during listening two with the support of LLP than during listening one.

"I find it interesting sometime I find it can make very silly mistake- just like me"

This participant took comfort in the realization that the LLP Technology sometimes failed to recognize words spoken by the lecturer and produced inaccuracies on-screen.

"maybe I'm very naughty I find it make a silly mistake I feel confident"

Finally, she reported gaining confidence from inaccurate digitised text.

The evidence points to CSR having helped participants relax, feel comfortable, and feel confident when listening to lectures. Thus, the LLP Technology decreased anxiety in participants when listening to lectures. Affective strategies are extremely important for preparing a state of mind in L2 students that is conducive to effective listening (Vandergrift 1999:169). The LLP Technology appears to generate affective strategies in the L2 classroom; therefore, it seems to have the potential to be an effective teaching tool in this regard.

Question 4. What was the effect of CSR on listening strategies?

CSR appeared to have a positive effect on participants' use of certain strategies and it had the greatest effect on the strategies of fixation, monitor, evaluation, and support and evaluate.

Fixation

Fixation usage decreased markedly during protocol two listening two (CSR) indicating a lesser need among the participants to fixate on a word not understood thus avoiding missing subsequent listening input. The fact of not becoming fixated on present input provides an advantage for the L2 listener who is then free to focus on subsequent input.

Monitor

The participants' use of monitor increased significantly during listening one (protocol two) only to decrease dramatically during listening two (protocol two). The reason for this may have been the participants' greater experience of using the CSR system and by using it more effectively greater understanding was generated.

Evaluation

The effect of CSR on participants' use of evaluation showed a pattern of increase from protocol one to protocol two for all except Benny. As a result, it would appear that CSR can generate metacognitive strategy use. LLP seems to have the capability to generate higher level strategy use among the participants.

Support and Evaluate

The most significant pattern to emerge from the protocol analysis was that of emergent support and evaluate strategies. This pattern showed an increase between protocol interviews. As a result, the implications for CSR as a teaching tool for the teaching of listening comprehension to L2 students could be very positive. In fact, one hypothesis emerging from the discovery of what has been coined a 'support and evaluate' strategy is that if L2 students listen to a lecture read twice once without and once with the support of CSR, it could increase their awareness of listening problems. This in turn would lead to more metacognitive awareness.

On this particular point, the questionnaire asked if CSR helped participants to be aware of their listening problems. A majority of participants (five) agreed that it did and four of these strongly agreed. One example of this awareness came in an email in which Amber spoke of her inability to recognize familiar words because of previously having practised an incorrect pronunciation of these words. She credited the CSR system with having helped her not only to recognize familiar words but also with having made her aware of this problem. The evidence from this participant demonstrates how LLP can support metacognitive strategy awareness.

Limitations with CSR

In the exploratory study, students called for greater accuracy in word recognition from the LLP Technology (Ryba et al. 2004). Limitations of CSR in the main study stemmed mostly from inaccuracies in word recognition and from the scrolling action of the text. For example, Benny had major problems with using CSR during protocol one. He found it difficult to distinguish between words that the system recognised correctly and those that the machine did not recognize correctly. This dilemma engendered by the inconsistencies in the accuracy of the system gave him in his own words "a little bit headache". He also complained about a perceived delay in the appearance of text on-screen. It would appear that this delay in the synchronicity of speech-to-text transcription caused Benny difficulties when thinking about meaning or spelling. This potential problem could originate from what Mayer and Moreno (2003) refer to as representational holding; a case of cognitive load where sounds have to be kept in auditory short-term memory (ASTM) until words appear on-screen. The task of holding sounds in ASTM may serve to increase cognitive load. Significantly, however, during protocol two, there was no evidence that Benny continued to have the same problems as during protocol one. It may be that experience of using the technology improved Benny's ability to cope with potential problems caused by representational holding.

Inaccuracies prompted one participant (Makiko) to wonder aloud at the inability of the system to recognize certain words that she herself had easily recognised.

Makiko also commented that such inaccuracy generated some indecision on her part about whether to record a particular word or not. The corollary was that her notetaking was negatively affected. For example, if she heard an unfamiliar word, it was difficult for her to record that word because of her indecision about whether to trust her instincts or rely on speech recognition. In short, she had two choices: attempt a spelling or read the screen. However, not wanting to note a potentially inaccurate word, she became confused about which to choose. If we remember that noting an incorrect word can disadvantage L2 students in the lecture theatre (Chaudron et al. 1994:88), then the necessity for such a choice may lead to a dilemma for L2 students.

The task of categorizing information in the notetaking framework proved problematic for some participants. This problem may have resulted from the categorising task itself. In fact, the quadruple tasks of listening, reading, notetaking and categorizing information may have created cognitive overload for at least one of the participants. A similar problem had arisen during the trial study when a question sheet was employed that generated extraneous cognitive load. In that case, the students had to split their attention (Kalyuga et al.1999:367-368) between reading a question sheet, listening, scanning the screen and taking notes. Thus the combination of tasks overloaded working memory resources such that few were left for comprehension.

Although the notetaking framework was employed in the present study to avoid a case of split-attention, it still seems to have generated a similar problem to that in the trial session.

The notetaking framework was designed to be an improvement on the question sheet because it eliminated reading. Indeed at university level when students take notes they have to think about how to note down information. Therefore, the task of putting the information into three columns should not have posed any greater problem than that encountered during 'freestyle' notetaking. Moreover, the participants were not told that correctly categorising the information was a required task. In support of the framework, Amber commented in an email that the framework helped her to understand what was meant by topic, key information, and additional information. In spite of this however, the framework seems to have cognitively overloaded at least one participant (Arina) by engendering incidental processing (Mayer & Moreno 2003:45).

With regard to the noting of content words, Makiko mentioned that when the on-screen text scrolled up, it made the search for a word more difficult. This problem was compounded when the words disappeared from the screen before the participant could see and note them. Interestingly, Makiko said in the questionnaire that she spent 90% of lecture time looking at the screen during listening two. This appears to be contradictory and the researcher can only speculate as to the reasons why she found it difficult to scan the text .

In responses to question four in the questionnaire that asked about potential difficulties looking for and finding words on-screen, three participants disagreed that such existed and three students agreed, of whom one strongly agreed.

To resolve this potential problem with scrolling text, Makiko asked in her email that bullet points be included alongside the digitised text to help participants track lectures.

Evidence from the present study points to possible problems using CSR technology in that some participants can lose their way during the lecture possibly because of the need to combine listening with reading and notetaking. As participants looked down to note information, some found it difficult to track noteworthy information because lectures were read initially without a pause. As a result, the participants lost track of the words on-screen. On the other hand, again appearing somewhat contradictory, Makiko who first raised this issue said in defence of the LLP Technology that it could help participants regain understanding of a lecture when they lost their way.

The overall aim of the main study was to further explore the use of CSR as a tool in the L2 classroom environment. To achieve this, the investigation aimed to focus in depth on listening comprehension, listening strategies and notetaking.

In this way, the researcher wanted to know how much participants understood, how they were listening and/or reading, and how well they noted the information they heard and/or saw with and without the support of CSR. Both the researcher and the teacher endeavoured to improve the accuracy of the on-screen text.

To this end, the teacher worked very hard to enhance the quality of speech recognition. Fortunately, his efforts led to an achievement of a 90% plus accuracy score in three out of five lectures.

Recommendations for Future Research and Teaching

The present study could be replicated with a larger sample and set up as an experimental design to include a control group. Information-driven lectures would be used to facilitate notetaking on the three-category framework employed in the present study. The English Language level of the students in the sample would range from pre-intermediate to intermediate through to upper-intermediate. It would be imperative to do an analysis of practice effects that had statistical validity. The study would last 6-12 weeks and the participants would take a listening comprehension test at pre-course and post-course to measure in a less subjective manner the affect of CSR on listening comprehension. Notetaking samples would be analysed by two scorers and the scoring system described in the present study would be used. If there was a protocol analysis, it would be analysed by two coders.

The practice effect figure of 11% has not been validated in this study; however, given the resources available, the figure does represent an attempt by the researcher to ensure the validity of the participants' notetaking skills with the support of CSR. Future research should endeavour to statistically validate a practice effect score.

Future researchers of the effectiveness of the LLP Technology would need to try to achieve a 95% plus accuracy level in the CSR. This would be necessary to lessen confusion among participants and to give the students confidence when noting information and spelling word. The speech rate of any teacher involved in LLP research should be monitored.

In addition to further research, EAP teachers might employ CSR to generate support and evaluate strategies with which to facilitate teaching listening to lecture skills in the classroom. These skills would include listening strategies, listening comprehension skills, and notetaking strategies. An EAP listening course format could follow the same procedures described in the present study. Special attention could be given to developing scanning strategies that could help students follow lectures as text scrolls up. For example, teachers could do this by highlighting with an infrared beam the last word spoken by them on the screen and follow this with a short pause so that students could track, take notes and follow the lecture more easily. This could potentially weaken mitigate against any problems resulting from the scrolling up of words on the screen leading to their disappearance.

The corollary could be an improved affective variable for L2 students as potential cases of anxiety generated by word searches might be avoided.

Some potential improvements to this study might include the following:

1. in order to facilitate recognition of the lecture language and vocabulary by the CSR system, the researcher chose textbook lectures that contained written language. These were read into the system during the practice sessions so that they could be recognized by CSR on lecture day. Authentic lectures contain spoken language read from notes and can include elements of spontaneous language not conducive to speech recognition by CSR at this stage. However, future research might take up the challenge of using spontaneous speech to deliver lectures.
2. lecturers have a particular style of lecturing that is natural and unique to each one. The lecturing style of 'reading aloud' that was chosen for this study was imposed on the teacher out of necessity as all the present course lectures contained written language. Future research might explore different lecture styles.
3. the scoring of the notes while experimental was rigorously analysed by the researcher alone. Future research could be designed to include measures of inter-rater reliability.
4. even though the sample was small, it facilitated interviewing by verbal protocol analysis. Future samples might be larger.

In conclusion, Bain et al. (2002) stated that to be successful LLP needed to have a positive effect on notetaking quality. In a similar vein, Clerehan (1995) posed the following: "What is in student notes and what relation do student notes have to the lecture discourse?" Responding to these questions it is intended that the present study shed some light on CSR and the listening and notetaking process with L2 students. Along with notetaking, this investigation looked at the effect of LLP on listening comprehension, listening strategies, and affective factors. An important feature of this study is that it endeavoured to create a fit for the technology within the ecology of the language classroom to maximize any potential benefit for the participants. Evidence of this emerged in the introduction of a pause after each chunk of information was read, beginning in lecture three and continuing until lecture five. This was a delimitation of this study. This change was prompted by one of Arina's emails that called for a slower reading.

Finally, the researcher would like the present study to be replicated so that the integration of LLP into an academic listening methodology can be investigated. The ultimate aim of the present study was to discover how effective LLP Technology was when integrated into a six week academic listening and notetaking course. It would seem that the technology has the potential to help students with learning to listen so that in future university lectures they can listen to learn more effectively.

Chapter 8

Reflections on the Research Journey

Introduction

This final chapter explains the significance and implications of the research and offers suggestions for future developments with CSR. In many ways, the present study can be considered as 'exploratory' in that it raised more questions than it answered. It provides, however, some important information on methods and approaches that could be adopted in future research and programme development with the aim of using CSR to create better conditions for learning. The development of CSR is at an early stage and as technical refinements take place, there are increasing possibilities for new applications in tertiary teaching as outlined in this chapter.

Development of new assessment procedures

A significant outcome of this investigation was the generation of new methods for analysing listening comprehension and CSR supported notetaking. The design of a system of measurement became a priority of this study.

This led to the construction of a framework for notetaking that served to complement information-driven lecture structure. The design of this notetaking framework thus made a significant contribution to knowledge in the field. An important aspect of the notetaking assessment was the inclusion of a practice-effect study to estimate the actual effects of CSR on listening comprehension. The premise underlying the concept of a practice effect score was that the highest increase in scoring from one lecture repeated two times without CSR support would represent a baseline score above which any higher scores in the main study could be attributed to the effectiveness of LLP Technology.

CSR benefits and challenges

The findings of this study confirm potential benefits that the LLP Technology can offer L2 students who are being prepared for academic listening. These potential benefits include: 1. increasing the quality of notetaking; 2. enhancing comprehension as measured by the number of matches recorded; and, 3. increasing metacognitive awareness of listening problems and enhancing affective areas of learning. On the other hand, the technology still has a number of challenges to meet before its true potential can be realized. In fact, a number of questions were raised as a result of the main study. These can be summarized as follows:

1. What further technical developments are required to improve the accuracy of speech-to-text conversion and display?
2. How can the potential problem of visual search be averted?
3. Why did some participants fail to correct the majority of their spelling mistakes with CSR support?
4. In relation to the notetaking framework, how can cognitive load resulting from incidental processing be reduced? For example, categorizing information into two columns might lessen cognitive load while continuing to allow students to record information in a logical and interconnecting way across the two instead of the original three columns. In other words, the task of categorizing would require less thought about that process.

While the accuracy of word recognition proved to be a problem in the present study, improved hardware and software will no doubt improve accuracy in future applications. A finding of the exploratory research was that accuracy needs to be improved in future investigations. In the main study, voice recognition training became a priority in advance of the first lecture. Indeed, this was a lesson in diplomacy and compromise as patience was required on the part of both teacher and researcher. Some frustrations arose initially as the teacher who is experienced in language teaching disliked the requirement of having to persist in repeating informational units into the system to produce accurate representations of words.

Fortunately, his enthusiasm for the system grew as accuracy was achieved. During the training period of six weeks, the chosen lectures were read into the system for periods of one hour at a time two times per week.

One obstacle to accuracy was the inability of the system to recognize spontaneous speech. This made it impossible for the teacher to introduce relevant but background experiences. For example, in lecture one, the teacher wanted to relate his struggle with giving up smoking, but this was not possible as the improvised speech would be less reliable. While non-recognition of spontaneous language proved to be a constraint of the use of the system, it did not negatively affect the main study as the lectures were read verbatim. In fact, the practice sessions produced an acceptable level of accuracy.

The teacher analogised the operation of the speech recognition technology to L2 information processing of lectures. He commented that in the same way as L2 students have listening problems such as mishearing words so too did the technology. While inaccuracies in speech recognition posed problems for the participants, some found that these mistakes motivated them by increasing confidence levels. Interestingly, the technology appeared to generate a competitive quality that was in turn a catalyst for self-improvement as participants competed with the system to achieve recognition of words heard.

These findings from protocol analysis interviews suggest that CSR could have motivational and other affective benefits for supporting academic listening in innovative ways. For example, students could be encouraged to compete with the technology and this would introduce the concept of a listening game that could potentially generate more effective participation in the academic listening process.

Potential innovative applications of CSR

While the LLP Technology used in this study was applied in quite a traditional instructional manner, there is much potential to use the technology in more innovative and interactive ways to support learning. Following are some illustrations of ways in which the CSR could be used more dynamically to support a range of learning activities:

1. Speaking to an audience: CSR could be used to train students how to present in front of an audience of peers. In this way, the dual learning objectives of pronunciation practice and listening practice would be simultaneously targeted.

2. Spaced lecture question and answer sessions: Students could practice asking questions after a part of a lecture has been delivered. The teacher or lecturer could elicit possible questions and voice them onto the screen for all students to see and assimilate. Then answers to the questions could be elicited and these also could be voiced on screen.

The advantage of the technology in this instance is that individual questions and answers that normally could pass over the heads of students might be assimilated into a learning repertoire and stored for future learning encounters in classroom or lecture contexts.

3. Listening methodologies: These could be designed around the technology so that tasks and activities would be available to complement it. In this way, the technology would complement the traditional textbook and audio-tape.

It would be important to note here that tasks as they are presented in some EAP listening textbooks should not be used with LLP Technology because of their potential to create a processing problem referred to as split attention. For example, listening textbook tasks can require the listener to listen to input, read words on the LLP screen and complete cloze sentences with information from the listening input. This would impose a cognitive load on L2 students similar to that found during the trial stage of the present research. Therefore, an effective methodology would include tasks that would facilitate processing. The notetaking categorization task as employed in a framework in this study is an example of such a suitable task because it permitted the participants to note information in an organized way across three categories to show logical and interrelated connections notwithstanding the fact that it engendered incidental processing.

CSR for optimising the lecture environment

The design of a methodology to complement the LLP Technology could break the negative cycle of expectation prevalent among lecturers who lecture to L2 students. Because the digitised text would support students' comprehension, the hope would be that lecturers' detailed notes become redundant. As the students could more effectively follow the lecture regardless of their level of listening ability, they could record their own detailed notes. In this way, they would be achieving a greater measure of independence, which in turn could have a positive effect on lecturers' expectations of their L2 students. An added advantage of the LLP System is that the voice and text files can also be streamed via the Internet as done in the exploratory study.

With specific regard to EAP, LLP Technology as applied in the present study could complement academic listening practice in preparation for the IELTS listening test. This test is taken by non-native speakers of English who want to attend English-speaking universities. The IELTS listening test contains four sections of which part four is the most difficult. Part four is a monologue described as a lecture so that it bears similarities with the textbook lectures read aloud in this study. The LLP Technology could facilitate effective teaching in this area with regard to lecture structures, vocabulary, and matching information including topics, key information, and additional information.

To complement discourse elements of these lectures, IELTS students could be made metacognitively aware of those strategies needed to improve their listening skills. These strategies would include Goh's (2002) inventory plus the emergent strategy of support and evaluate so that students can learn self-regulation when scanning digitised text. For example, if students listened once without CSR and then once with CSR, they could begin to recognize elements in listening input related to lecture structure that they missed during the first listening.

Self improvement of listening skills

Potentially the most important feature of LLP Technology is its impact on the L2 student in the area of self-improvement in listening skills. Traditional methods of teaching listening may only be as effective as levels of listening ability permit. As weaker listeners find it difficult to understand monologues and lectures for a variety of reasons such as speed of delivery, teachers may need to resort to employing transcripts that can be read during a lecture or monologue.

However, the problem with transcripts is that students can engage in reading where they can self-pace and review without actually listening. CSR in the form of digitised text operates differently because the student cannot self pace and review without missing present input as the text scrolls up and disappears after a short time. Therefore, students have to listen and follow the digitised text in real time whereas with transcripts students can get interested in particular sections of text and reread until they achieve total understanding.

Of course, students can also review on-screen digitised text. It may be however that the scrolling action of the system exerts its influence on the ability to self pace. While transcripts are guaranteed to improve reading skills to some extent, the LLP System can make students aware of their listening problems so that when they are taught regularly using LLP, they can become aware of problem listening areas and try to improve these areas. The LLP System as employed in the present study can put the onus for self-enhancement of listening skills into the hands of the student.

Finale

The findings of this research indicate that there is room for optimism about the potential of CSR as a means of supporting L2 students with the aim of improving listening comprehension and notetaking, engendering metacognitive listening strategy awareness, and increasing motivation to learn. In a practical sense, L2 students could be trained to metacognitively evaluate their listening ability by listening to a lecture firstly without the LLP Technology and then with the LLP Technology. In this way, students can become more independent learners because they have the technology to independently measure their own level of understanding and quality of notetaking. Thus they can take control of their own learning to enhance their listening skills.

Anecdotal evidence from two research participants presently studying at university suggests that the LLP course benefited their academic listening skills. These students credit LLP Technology with having helped them to achieve the required IELTS listening scores for university entrance.

In conclusion, there are some exciting new approaches to learning that have been made possible with CSR technology. There is a need, however, to develop some new pedagogical approaches in order to fully take advantage of CSR for language learning, notetaking and listening comprehension. Experiences with using the LLP Technology in the present study indicate that this can add a lot of meaning to the lecture and to the individual learning situation. It transfers a greater level of control from the lecturer to the students as evident in the increased notetaking ability and the enhanced motivational effects described in the present study. It is hoped that future research can build upon the present study in order to precisely understand the best and most effective ways to use CSR to create better learning conditions for L2 students.

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Appendix A

Massey University

COLLEGE OF EDUCATION
Te Kupenga 0 Te Matauranga

LIBERATED LEARNING STUDY STUDENT INFORMATION SHEET

LEARNING AND TEACHING Private Bag 102 904 North Shore MSC Auckland
New Zealand
T 649443 9688
F 649443 9717 www.massey.ac.nz

My name is Dr. Ken Ryba and I work at Massey University in Albany as an Associate Professor and researcher in Education. I am very interested in the academic learning experiences of overseas students whose first language is not English and also students with disabilities. I am currently doing research on a new technology that may help students to improve listening comprehension and participation in lectures. The aim of the project is to trial the use of the technology to see if this helps to improve listening comprehension, notetaking skills, and academic achievement.

The new technology is called "Liberated Learning" and will be demonstrated to you here in the class. This makes use of advanced speech recognition system that receives a digitised transmission of your lecturer's speech. The text is displayed via projector so that you can simultaneously *see* and *hear* the lecture as it is delivered. The text of each lecture will then be streamed on the internet afterward within your class webCr forum. It is up to you to decide whether and to what extent you wish to use these facilities.

The "Liberated Learning Project" was initiated by Saint Mary's University (Halifax, Canada) in 1998 and is now used by several other universities throughout Canada, the United States, and Australia. Our Massey University Project was made possible by a grant from the Fund for Innovations and Excellence in Teaching. This is the first time that the Liberated Learning Technology has been used in New Zealand.

You are invited as a student enrolled in 157.100 *Introduction to Information Systems* to participate in the project. Whether or not you decide to participate will in no way affect your coursework or your grade. Your course lecturer Maha Shakir will not know which students are participating in the trial use of the technology. Whether or not you participate in the project, you can make use of the new facilities.

If you agree to participate in the project then I would like you to sign a consent form and leave this at the back as you exit from the auditorium. The research may involve you taking part in all or one of the following: providing a copy of your notes in exchange for a set of complete notes prepared by your lecturer, completing a brief questionnaire, participating in a webCT online discussion forum, and an e-mail discussion on your classroom experiences. The research will be conducted during your class lecture time and you will not be required to give of your free time. It is hoped that this project will to create more effective methods of lecturing so that your ability to understand lectures and take notes can be improved. Your decision to participate will have no effect on your coursework, assessment and grade.

Your questionnaire and lecture notes will only be seen by the researcher and assistants. All data recordings will be stored in a secure location, with no public access and used only for this research. In order to maintain anonymity, the names of participants will be assigned pseudonyms in any publications arising from this research. At the end of the year, a summary of the study will be made available for you to read.

Please note you have the following rights in response to my request for you to participate in this study.
. decline to participate;
. decline to answer any particular question;
. withdraw from the study prior to the fourth week of term;
. ask any questions about the study at any time during participation;
. provide information on the understanding that your name will not be used;
. be given a summary of the project findings when it is concluded.

If you have further questions about this project you are welcome to discuss them with me personally:

Associate Professor Ken Ryba: Massey University. Albany. College of Education. Department of Learning and Teaching. Phone: (09) 443 9688. Email. K.A Rvba@massev.ac.nz

Note: This Project has been reviewed and approved by the Massey University Human Ethics Committee, ALB Application MUAHEC 04/043. If you have any concerns about the conduct of this research, please contact Associate Professor Kerry Chamberlain,
Chair, Massey University Campus Human Ethics Committee: Albany, phone 09 4140800 ext. 9078, e-mail humanethicsalb@massey.ac.nz

Appendix B

Massey University

COLLEGE OF EDUCATION

Te Kupenga 0 Te Matauranga
LEARNING AND TEACHING Private Bag. 102 904 North Shore MSC Auckland
New Zealand
T 64 9 443 9688
F 64 94439717 www.massey.ac.nz

LIBERATED LEARNING PROJECT

Consent Form - Student

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I give my consent to each of the following

Please circle YES or NO to show if you agree to participate

I agree to take part in a questionnaire.	YESNO
I agree that the researchers can access my mid term test and final test results for research purposes only	YESNO
I agree to be contacted by email to ask my views about using speech recognition in the university classroom.	YESNO
I agree to participate in this study under the conditions set out in the Information Sheet.	YESNO

I understand that my participation in the project is not a course requirement and will in no way affect my course grade or involvement in the course

I understand that all of the information that I provide will be kept confidential by the researchers and used to prepare a report on the overall class experiences with the liberated learning system. Data and information from the project may also be used for professional research articles and publications.

I agree to participate in this research under the conditions set out. above

Signature:----------

Date:----------

Full Name – printed----------

Email:----------

Revised 30/10/02.. Format for the Information Sheet

Appendix C

Massey University

COLLEGE OF EDUCATION
Te Kupenga 0 Te Matauranga

LEARNING AND TEACHING Private Bag 102904 North Shore MSC Auckland New Zealand'
T 6494439688
F 6494439717 www.massey.ac.nz

Liberated Learning Project
QUESTIONNAIRE 157.100
Introduction to Information Systems

This is the first time that we have tried using continuous automated speech recognition in a university classroom at Massey University. In order to assess the value of this system, we would be grateful if you could please complete the following questionnaire. Your feedback' will help to make decisions about if we should continue with this project and what steps need to be taken in order to improve the system.

MASSEY STUDENT ID NUMBER: ----------
NAME:----------

(Note: Your name and number is required for research purposes only. The information that you provide will be kept confidential by the researchers. Your lecturer will not see this information.)

1. Which of the lectures did you attend where the liberated learning automated speech recognition was used? (Please tick the lectures you attended)

Lecture 2 - 20 July Lecture 3 - 27 July Lecture 4 - 3 August

2. How much use of the speech-text display did you make in class? (Please tick the one that applies)

Not at all or hardly at all
Occasionally (+/- 25 percent)
Sometimes (+/- 50 percent)
Frequently (+/- 75 percent)
All or nearly all of the time

3a. Were you able to access the streamed speech-text/audio files on webCT? (Please tick the one that applies)

YES, I was interested and able to access these	
NO, I did not need these for my study	
NO, I thought there were too many technical difficulties	

3b. If yes, how much did you use the streamed speech text/audio files on webCT? (Please tick the one that applies)

Not at all	
1 -2 times	
3 - 5 times	
More than 5 times	

4. Please rate each of the items on the following scale to show if you agree or not (Please tick the one that applies)

Item	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**
The speech-text display helped me to understand the lecture				
The speech-text display helped me to take notes				
The streaming of the lecture text on webCT helped me to understand				
The steaming of the lecture text on webCT helped me to take notes				
The *Liberated Learning Project* was very successful				
Liberated Learning is easy to use				

5. **What do you think are the main advantages of the *Liberated Learning* system?**

6. **What do you think are the biggest problems with using the *Liberated Learning* system?**

7. **Is there anything that you think should be improved?** (Please Circle)

YES

NO

If yes, what should be improved and why?

Thank you very much for taking the time to complete this questionnaire.

If you have further questions about this project you are welcome to discuss them with me personally:

Associate Professor .Ken Ryba: Massey University. Albany. College of Education. Department of Learning and Teaching. Phone: (09) 443 9688. Email. K.A Ryba@massey.ac.nz .

Note: This Project has been reviewed and approved by the Massey University Human Ethics Committee, ALB Application MUAHEC 04/043. If you have any concerns about the conduct of this research, please contact Associate Professor Kerry Chamberlain, Chair, Massey University Campus Human Ethics Committee: Albany, phone 09 414-0800 ext. 9078, e-mail humanethicsalb@massey.ac.nz

Appendix D

Notetaking Framework Template-date

LISTENING. No.

Name:

Topics and subtopics	Key information and questions about topics and subtopics	Additional information

Appendix E

Lecture on Nicotine Addiction

Today I'm going to be discussing nicotine addiction, the health risks and effects of smoking and will end up looking at strategies for treating it.

Now as you know cigarette smoking is more than just a bad habit, it's a major public problem worldwide. The first point is that
IS THIS INFORMATION IMPORTANT?
WHAT AM I GOING TO SAY NEXT?
HOW DO YOU KNOW?
cigarette smoking is addictive -
that means that when you start to smoke cigarettes - even casually - your body becomes dependent on them and you begin to crave them, and when you crave something you need it, want it and you feel that you must have it.
This causes you to use more and more - and once you become dependent on cigarettes it's very difficult to quit.

Millions of people around the world smoke cigarettes
But despite the fact that cigarette smoking has declined in the United States over the past 30 years, there are still over 15 million Americans who smoke.
Rates of smoking are
higher among men than women
higher among nonwhites than whites
and people with less than a high school education, are more likely to smoke

Let's take a look at the health risks of smoking

Smoking cigarettes is dangerous.
In fact it's the leading cause of preventable death in the United States.
Every year over 400,000 Americans die as a result of cigarette smoking and another 10 million suffer from smoking-related diseases.
REPEAT ?S
Let's look at these facts:
Cigarette smokers are at higher risk of developing heart disease, high blood pressure.
and certain cancers especially lung cancer, or respiratory disease, than non-smokers.

And we all know that smoking during pregnancy increases the risk of delivering a low birth weight baby.

But you don't have to smoke, to be in danger from tobacco.
REPEAT ?S
Take other forms of tobacco use, such as cigar and pipe smoking, and smokeless or chewing tobacco, for example.
They can cause health problems too.
Smokeless or chewing tobacco is associated with an increased risk of mouth cancer, gum disease and tooth loss.

And you don't have to smoke to be in danger.
Non-smokers who live or work in smoke-filled environments
are also effected by passive or second-hand smoke.
And of particular concern are children who live in homes where the parent smoke.

It is worth noting that the health hazards to non-smokers from passive or second-hand smoke have resulted in the introduction of laws in many countries which ban cigarette smoking in most public places - like offices, schools, planes, trains and buses.
REPEAT ?S

So if it's so bad for us why do people smoke?

Obviously people smoke for a number of reasons:
Teenagers often smoke because they might think that it's cool or because it makes them feel grown up.

Secondly, their friends or their parents may smoke.

Thirdly young people may also be influenced by seeing movie stars, athletes and other celebrities who smoke, or use other tobacco products.

It is interesting to note that most of the people who now smoke began when they were teenagers, and as a consequence, tobacco companies often target young people with cigarette advertising.

What's more, more and more children have begun to experiment with cigarette smoking at younger and younger ages.

Interestingly, tobacco companies in The US, as well as targeting young people, also target African-Americans, Latinos, and Women.

But 'so what' ? you might ask.

Some people find smoking pleasurable.
They find tobacco helps them relax or they may find it physically stimulating.
Others may enjoy the feel of a cigarette in their hands, and like the actual act of smoking.
Interestingly enough, most smokers or uses of tobacco products don't consider themselves dependent on cigarettes. We have all heard smokers say "I've given up many times ."
REPEAT ?S

However, when they attempt to stop smoking it is almost always extremely difficult so most people who start smoking do indeed become addicted .

Now lets turn to the chemicals in tobacco smoke and then we'll go to the effects they have on the body, the effects of nicotine withdrawal, and finally we'll turn to strategies and ways smokers use to quit.

Cigarette smoke contains thousands of chemicals many of which are dangerous to human health.
REPEAT ?s
The two best-known chemicals are tar and nicotine.

Tar and other chemicals in cigarette smoke have been shown to cause lung cancer which is the most common form of cancer in the United States and which causes over 150,000 deaths each year.

Nicotine is considered to be the actual drug that is responsible for tobacco addiction.
REPEAT ?S

Lets look at the effects of nicotine on the body.

When smokers inhale, nicotine enters the bloodstream and then the brain.
It's taken up by the brain very quickly and within 10 seconds of inhaling cigarette smoke into the lungs, nicotine reaches and stimulates the brain.
This stimulating effect causes smokers to experience a feeling of increased well-being-either alertness or relaxation.
Smokers have described these positive feelings using terms like pleasure, increased alertness and better concentration, better mood, improved ability to accomplish a task and stimulation.

Nicotine also has other effects on the body- both short-term and long-term
Short-term effects include increases in heart rate and blood pressure
Long-term effects include an increased risk of developing hardening of the arteries and heart attacks

In addition to the physical dependence on nicotine
smokers often develop a psychological dependence because of its pleasant effects
This ties in with the craving I talked about earlier
This dependence causes smokers to crave cigarettes in specific situations, for example, while drinking coffee or when under stress
OK at this point let's turn to the effects of nicotine withdrawal.
When a smoker stops smoking he or she will experience discomfort due to nicotine withdrawal.
These symptoms of nicotine withdrawal can appear within six to 18 hours after the last cigarette is smoked.
REPEAT ?S
They include irritability, anxiety, restlessness, difficulty concentrating, headache, sleep disturbances and depression.
In addition to these symptoms, many people find that they eat more and gain weight when they attempt to quit smoking.

Because of these physical symptoms of nicotine withdrawal and a psychological dependence on the drug, it usually takes more than willpower to quit smoking.

In fact only 20 to 25% of people quit smoking for more than one year.

So what strategies do smokers use to help them quit?

Well, most people who decide to quit smoking do so on their own. In other words they go 'cold turkey'.
But for this strategy to work, the person must be highly motivated
For some smokers however simply giving up cigarettes will not enable them to quit because the physical and psychological effects of nicotine withdrawal are too great.

Fortunately for these smokers, there are number of psychological support programs available.
For example, smokers can meet in groups and receive counselling and support to help them quit.
These programs emphasize changing behaviour, and substituting healthy habits like exercise for cigarette smoking

There are also medical therapies designed to ease the stress of nicotine withdrawal such as nicotine patches, which the smoker can wear, or nicotine gum, which he or she can chew. These ease the craving for cigarettes and are less drastic than going cold turkey.
REPEAT ?S

There are drawbacks however to these strategies.
Some people may not like meeting in groups, or they may not like receiving counselling.
Some people may not have the self discipline to continue wearing nicotine patches every day because it requires doing the same thing day after day.
But it has to be said that there are many health benefits for people who quit smoking. These include a reduction in the risk of developing smoking-related diseases, a healthier feeling overall, greater enjoyment of everyday activities and a greater sense of self-esteem.

So to recap the main points:

Smoking is a major public health problem worldwide.
Tobacco is highly addictive.
It causes both physical and psychological dependence.
It is difficult to give up.
But there are strategies which can help you.
For those who do give up successfully, the benefits gained are well worth it.

Appendix F

Question sheet for trial stage: Lecture on Nicotine Addiction

A. Cigarette smoking is .....

B. Statistics on cigarette smoking .....

1. In the US., smoking has .....
2. Number who smoke .....
3. Higher rates among .....

C. Health risks of cigarette smoking .....

1. Number who die .....
2. Number who suffer from diseases .....
3. Smoking-related diseases and risks include .....
4. Non-smoking risks .....

D. Why smoking is addictive .....

E. What causes young people to start .....

F. The addictive power of nicotine .....

1. Cigarette smoke contains .....
2. General effects of nicotine .....
3. Short-term effects .....
4. Long-term effects .....
5. Psychological effects .....
6. Effects of nicotine withdrawal .....
   a. Symptoms include .....
   b. Percent who remain smoke-free after one year .....

G. Strategies for treating nicotine addiction .....

H. Quitting on your own requires .....

I. Other methods include .....

1 .....

2 .....

J. Benefits of quitting smoking .....

Appendix G

LIBERATED LEARNING STUDY

STUDENT INFORMATION SHEET

My name is Tom McIvor and I am a student at Massey University in Albany. I am very interested in the academic learning experiences of overseas students whose first language is not English. I am currently doing research on a new technology that may help students to improve listening comprehension and participation in lectures. The aim of the project is to trial the use of the technology to see if this helps to improve listening comprehension and notetaking skills.

The new technology is called "Liberated Learning" and will be demonstrated to you here in the class. This makes use of advanced speech recognition system that receives a digitised transmission of your lecturer's speech. The text is displayed via projector so that you can simultaneously *see* and *hear* the lecture as it is delivered. The text of each lecture will then be streamed on the internet afterward within your class webCT forum. It is up to you to decide whether and to what extent you wish to use these facilities.

The "Liberated Learning Project" was initiated by Saint Mary's University (Halifax, Canada) in 1998 and is now used by several other universities throughout Canada, the United States, and Australia. Our Massey University Project was made possible by a grant from the Fund for Innovations and Excellence in Teaching. This is the first time that the Liberated Learning Technology has been used in New Zealand.

You are invited as a student enrolled in a course at the language institute to participate in the project. Whether or not you decide to participate will in no way affect your coursework.

If you agree to participate in the project then I would like you to sign a consent form and leave this at reception in the language institute. The research may involve you taking part in one or all of the following: providing a copy of your notes, completing a brief questionnaire, participating in an e-mail discussion on your classroom experiences. The research will be conducted during your class time and you will not be required to give of your free time. It is hoped that this project will create more effective methods of teaching listening to lecturers so that your ability to understand lectures and take notes can be improved. Your decision to participate will have no effect on your coursework, assessment and grade.

Your test results, questionnaire and lecture notes will only be seen by the researcher. All data recordings will be stored in a secure location, with no public access and used only for this research. In order to maintain anonymity, the names of participants will be assigned pseudonyms in any publications arising from this research. At the end of the year, a summary of the study will be made available for you to read.

Please note you have the following rights in response to my request for you to participate in this study.

- decline to participate;
- decline to answer any particular question;
- withdraw from the study at any point;
- ask any questions about the study at any time during participation;
- provide information on the understanding that your name will not be used;
- be given a summary of the project findings when it is concluded.

If you have further questions about this project you are welcome to discuss them with me personally: Tom McIvor: Waikato University Language Institute. Auckland Campus. Phone: (09) 302 1735. Email. mcivor@waikato.ac.nz

LIBERATED LEARNING PROJECT

Consent Form – Student

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I give my consent to each of the following

Please circle YES or NO to show if you agree to participate

I agree to take part in a questionnaire.	YES NO
I agree to let the researchers test my listening comprehension and note taking skills.	YES NO
I agree that the researchers can record my voice on tape for research purposes	YES NO
I agree to participate in this study under the conditions set out in the Information Sheet.	YES NO

I understand that my participation in the project is not a course requirement and will in no way affect my course grade or involvement in the course

I understand that all of the information that I provide will be kept confidential by the researcher and used to prepare a report on the overall class experiences with the liberated learning system. Data and information from the project may also be used for professional research articles and publications.

I agree to participate in this research under the conditions set out above

Signature: _____ **Date:** _____

Full Name - printed _____

Appendix H
Questionnaire

	strongly disagree	disagree	agree	strongly agree
1) LLP helps me to understand lectures				
2) LLP helps me to take more detailed notes				
3) LLP helps me to understand words such as way, approach .				
4) I find it difficult to look for and find words on the screen				
5) LLP helps me to concentrate even when I do not understand				
6) I feel relaxed when I can read what I hear on-screen				
7) LLP helps me to recognize familiar words				
8) I find it difficult to think about meaning when I listen and look at the screen				
9) LLP helps me to recognise discourse markers				
10) LLP helps me to learn new words				
11) LLP helps me to know if information is important to note or not				
12) LLP helps me to take more notes				
13) I would like to have LLP in my other class				
14) LLP helps me to understand intonation				
15) looking at the screen helps me to understand my listening problems				
16) LLP helps me to understand the meaning of words and phrases				
17) the words appear on the screen too slowly for me				
18) LLP helps me to guess the meaning of words and phrases I do not know				

19) LLP helps me to build knowledge of a lecture topic				
20) sometimes I do not know if the words on the screen are correct				
21) I prefer to listen to lectures with the help of LLP				
22) LLP helps me to improve my spelling				
23) LLP helps me to be a confident listener				
24) LLP helps me to imagine the message in the lecture				

25. Circle one of the following %'s:

I look at the screen when I am listening to the teacher

10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

of listening time

26. What do you think are the main advantages of the *Liberated Learning* system?

27. What do you think are the biggest problems with using the *Liberated Learning* system?

28. Is there anything that you think should be improved?
YES
NO

If yes, what should be improved and why?

Thank you very much for taking the time to complete this questionnaire.
Professor Ken Ryba chief researcher Liberated Learning Project
Tom McIvor. EdD. student and assistant researcher Massey University

Appendix I

Notetaking Framework for Lecture on Nicotine Addiction

Topics and subtopics	**Key information and questions about topics and subtopics**	**Additional information**
Smoking	Major public problem worldwide People become dependent on cigarettes Cigarette smoking is addictive	People crave cigarettes 15 million Americans smoke
Rates of smoking	Higher among men than women Higher among nonwhites than whites Less educated more likely to smoke	
Health risks	Smoking is dangerous Leading cause of preventable disease	400,000 Americans die from smoking 10 million suffer smoking related diseases
Smoking related diseases	Higher risk of developing Heart disease High blood pressure Cancers of delivering low birth weight baby	
Passive smoking	Affects non-smokers	Laws introduced to lessen impact of passive smoking
Other forms of tobacco use	Cigar and pipe smoking, chewing tobacco Cause health problems such as: Chewing tobacco may cause Mouth cancer, gum disease, tooth loss	

Smoking is addictive	Why do people smoke? Teens smoke because its cool Friends or parents might smoke Under influence of the famous Most smokers don't think they are addicted It is very hard to stop	Smoking is also pleasurable Most people began smoking as teenagers Cigarette companies target young with advertising
Chemicals in cigarette smoke	2 best known chemicals out of thousands = tar and nicotine they cause lung cancer	Causes 150,000 deaths a year
Nicotine Psychological dependence	nicotine is responsible for addiction increases heart rate and blood pressure short term increases risk of developing hardening of the arteries long term. as well as physical dependence	Causes smokers to crave cigarettes when under stress or while drinking coffee
Nicotine withdrawal	symptoms appear 6-18 hours after last cigarette is smoked these include: irritability, anxiety, restlessness difficulty concentrating, headaches, sleep disturbances, depression	Smokers who quit eat more and gain weight Only 20-25% of people quit smoking for more than a year
Strategies	go cold turkey=stop smoking without help psychological support programs=smokers receive counselling and support medical therapies =nicotine patches or nicotine gum	Doomed to failure Some people hate meetings And counselling People lack self discipline
Health benefits	disease reduction healthier feeling greater enjoyment of everyday activities greater sense of self esteem	

Appendix J

M. Goh/ System28 (2000) 55-75
Listening strategy
Cognitive tactics

	perception	*parsing*	*utilisation*
a. Infer missing or unfamiliar words using contexts, co-text and prior knowledge	X		X
b. Predict general contents before listening using contexts and prior knowledge	X		X
c. Predict unfinished utterances using contexts, co-text and prior knowledge	X		X
d. Use prior knowledge to elaborate and complete interpretation			X
e. Take short notes of important content words		X	X
f. Relate limited interpretation to a wider social/linguistic context			X
g. Relate one part of the text to another			X
h. Visualise scenes, objects, events etc. being described		X	X
i. Reconstruct meaning using words heard		X	X
Metacognitive tactics			
a. Preview contents in different forms	X		
b. Rehearse the pronunciation of potential content words	X		
c. Establish purpose for listening	X		X
d. Listen selectively according to purpose	X	X	X
e. Pay attention to discourse markers		X	X
f. Pay attention to visuals and body language	X		
g. Pay attention to tones and pauses	X	X	
h. Monitor comprehension using contexts and prior knowledge			X
i. Evaluate comprehension using contexts, prior knowledge and external resources			X
j. Continue to listen for clarification in spite of difficulty	X		
k. Assess the importance of problematic parts and decide whether to ignore them or actively seek clarification	X		
I. Determine the potential value of subsequent parts and vary intensity of attention accordingly	X		
Socio-affective tactics			
a. Ask speaker for clarification and repetition	X		X
b. Paraphrase what speakers say to check understanding			X
c. Learn to relax before and during listening	X		
d. Encourage oneself to continue listening	X		

Appendix K
Transcripts

Protocol Analysis 1	**Strategies**
Benny listening 1	
1. Addiction	fixation
2. What's addiction	ask for clarification
3. No sorry	
4. Oh yeah	
5. Ok	monitor
6. 3 million	fixation
7. very poor people usually use tobacco	paraphrase
8. tobacco and (?)	ask for clarification
9. Appetite suppressa (tries)	fixation
10. I don't know this	monitor
11. Oh ok	
12. Yeah	
13. They want to relax and this things very cheap and-	paraphrase
14. That's good	monitor
15. Anaemic?	fixation
16. What's anaemic?	ask for clarification
17. Ok	monitor
(Silence)	
18. sorry this I don't know	monitor
19. eveloping country don't decision ...to make this ...	paraphrase
20. fo for the people-	monitor?
21. 10%	fixation
22. 60%	fixation
23. alcohol	fixation
24. what's alcohol?	ask for clarification
25. 7-8 million	fixation
26. little bit	monitor
27. I don't understand about this-	monitor
28. Sorry this psychoacton suss	ask for clarification
29. Normal function in the brain	fixation
30. What's normal function	ask for clarification
31. Oh yeah I know this	monitor
32.70 countries	fixation
33. yeah ok	monitor
34. this I don't know sorry	monitor
35. yeah	monitor
36. no	monitor
37. I should guessed but I don't know this	evaluate
38. Spiri world	fixation
39. Spigaret?	fixation
40. Means developing country	ask for clarification
41. Mm yeah I know	monitor
42. Indiginon people	fixation

Protocol Analysis 1 Benny Listening 2

1. Ok start	
2. Ok	
3. Health organization	fixation
4. Yeah	monitor
5. Various addictions	fixation
6. Continue ok	
7. I know the mean.. the meaning	monitor
8. Tobacco	fixation
9. Yeah	
10. Alcohol	fixation
11. Alcohol	fixation
12. Drugs	fixation
13. Different parts of the world	directed attention
14. Mm mm	monitor
15. Mm continue	monitor
16. To stop pangs	fixation
17. Is this right no	ask for clarification
18. P a n g s pans	fixation
19. I don't know this even I read this word	
20. I also don't know this sentence means ..meaning	monitor
21. To carry oxygen	directed attention?
22. Mm I feel a little bit ..yeah	comment
23. When I hear your voice and read this I feel a little bit headache because I don't know which one is correct yeah	evaluation
24. If I read the mond (monitor) I think…mm	
25. Something I feel …this correct?	evaluation
26.I will mm go with this way to think about your meaning but I think this not correct yeah	
27.A little bit ….	evaluation
28. The first program that's very useful when I saw the mond this (points) calle mond I	
29. know the meaning it can help me to understand a little bit your meaning but the	
30. second program I don't know the manage the moniture the meaning when you talking	
31. so I lose my way when I saw this mond this moniture and hear your voice I lose my	
32. way because I don't know I can't hear your voice and see the moniture at the same	
33. time I can't think anymore you know yeah	evaluation
34. Yeah go ahead	
35. Governments ok	monitor
36. Ok	monitor
37. Yeah	monitor
38. 10% children	reads
39. are dependent ok go on	monitor
40. production by 60%	monitor
41. mm	monitor
42. er cigarettes?	asks for clarification
43. the cigarette	fixation
44. ok continue	
45. alcohol in Russia mm	monitor
46. was traditionally high ok	monitor
47. oh some words I don't know the meaning	monitor
48. yeah	monitor
49. home may alcohol I don't know this sentence the meaning	monitor
50. yeah	monitor

51. yeah monitor
52. the number is rising dependent on alcohol people paraphrase
53. numbers of people are increasing ok paraphrase
54. mm ok I know this meaning yeah when I saw themoniture the monitor yeah
55. no no no I hear your speaking yeah I know the mean meaning
I don't see the moniture evaluation
56. addiction fixation
57. yeah
58. the problem is street children monitor
59. oh yeah I know I hear your speaking I can think evaluation
60. mm monitor
61. psychoactivity active psychoactive fixation
62. psycho active fixation
63. substantifs I don't know this words meaning monitor
64. change yeah it can help me to understand this yeah this sentence yeah the moniture
65. yeah it can help me to understand this sentence support and evaluation
66. glue fixation
67. which one ask for clarification
68. cheap fixation
69. si (?) Available ok that's good monitor
70. when I saw the monit moniture it can help understand this sentence that's good
71. continue support and evaluation
72. marihwa? fixation
73. Marijuana? fixation
74. I don't know this the name monitor
75. Co
76. Cocaine yeah a little bit lose my way evaluation
77. People no I don't know this meaning monitor
78. I also don't know about the moniture the meaning (laughs) evaluation
79. Mm yeah (I explained)
80. Oh yeah ok I know monitor
81. 70 country fixation
82. mm yeah I can't catch the speed too quickly you know when I see moniture and hear
83. your voice I become difficult to think in my opinion so I think this is a problem
84. I could not thinking I just ....when I hear your voice and see the moniture I could not
85. thinking by myself yeah evaluation
86. I think thinking is very important because I think I don't need the program because it
87 .makes me not thinking by myself and sometimes it makes me lose my way
88. Yeah I think mm just hear your voice and I can thinking that's good for me yeah
evaluation

Protocol Analysis 2
Benny Listening 1

1. Ok	monitor
2. ok	monitor
3. Sorry I didn't ….. /pardon/ can you repeat?	ask for clarification
4. By eighth grade/ I don't know what it is	monitor
5. Ok	monitor
6. One secure secure I don't know it	monitor
7. Secure what	ask for clarification
8. Insecure in social situations/ I don't know what	monitor
9. Insecure	fixation
10. Yeah can relax or	paraphrase
11. Ok	monitor
12. They believe smoking is unhealthy yeah	paraphrase
13. Yeah ok	monitor
14. Ok I know (addicted)	monitor
15. I think this more popular yeah because a lot of children nowadays they have some	
16. problem come from family and study	paraphrase
17. What's that sorry?	ask for clarification
18. Exact mm	fixation
19. I think maybe they want to relax or …	inference
20. Ok	monitor
21. you say struck something struck the first sentence yeah drug	paraphrase
22. Ok	monitor
23. increase heartbrake	fixation
24. I don't know how to ……..	monitor
25. Ok	monitor
26. so the lot of bad thing in tobacco can cause ….become ill	paraphrase
27. Ok	monitor
28. I think tack these things bad for our lung it can cause us become make it cancer	inference
29. I don't know this sentence (odourless. colorless gas)	monitor
30. I think this about exact our body	inference
31. 1000 people die ok	monitor
32. respiratory system?	ask for clarification
33. Ah system about lung	paraphrase
34. Ok so they are different between smoker and non smoker	paraphrase
35. I don't know this (tar and chronic coughing)	monitor
36. Ok I think this tell me how the tobacco destroy our lung	inference
37. I think this also tell me how the tobacco destroy our lung	inference
38. I think this also talk about how tobacco destroy our lung	inference
39. Lung cancer	fixation
40. I think some sick about our lung	inference
41. Ok this talk about how our lung to work	paraphrase
42. Circulatory system I don't know what	monitor
43. Oh I think that system about our blood to in our body	inference
44. How to send to all our body	paraphrase
45. In the hand and feet sorry I don't know(tingling)	monitor
46. I don't know/I don't know	monitor
47. Smoking damage heart	paraphrase
48. What the difference between smoker and nonsmoker	paraphrase

49. What different about smoker and nonsmoker paraphrase
50. Yeah smoking cause our blood become bad or slow paraphrase
51. If the people don't smoke maybe the heart disease will decrease inference
52. Frowned upon frowned upon by smoke I don't know monitor
53. Nonsmoker they don't like smell tobacco paraphrase
54. They become healthy paraphrase
55. Smoker have ...sorry I don't know monitor
56. I know passive smoke second hand smoke monitor
57. Ok monitor
58. I think there are a lot of way to cause passive smoke inference
59. Ah how the passive smoke damage nonsmoker lung paraphrase
60. Yes it can cause heart disease lung disease or something else paraphrase
61. Ok monitor
62. five hundred die from passive smoke paraphrase
63. Children fixation
64. I think this more danger than children. for children inference
65. Yes monitor
66. Ok monitor
67. Ok monitor
68. Wow its more danger for children if their parents smoke comment
69. Yes I think so (non smokers' rights) opinion
70. Nonsmoker they need fresh air so they need to do something to make this area
71. nonsmoking paraphrase
72. Yeah this I think non smoke in restaurant this very popular in some country inference
73. Ok monitor
74. Sorry I don't know this monitor
75. Yes I think so because smoking is unhealthy opinion
76. Ok monitor
77. Withdrawal they will addicted to smoke paraphrase
78. I think they will addicted to smoking to use tobacco inference
79. So how the tobacco cause our body become sick paraphrase
80. I don't know this monitor
81. It means some people will help you to give up smoke paraphrase

Benny Protocol Analysis 2 Listening 2

1. Ok monitor
2. Why do teams start to smoke? reads
3. Question ok that's ok monitor
4. Any difference no the same comment
5. Smoking can remove their fears reads
6. I think yeah a lot of people they think smoking can let them relax and feels good- inference
7. Maybe that's not impossible because smoking is unhealthy opinion
8. Also play a role (reads)
9. Advertising I think advertising is the most important way to teach teens to smoking paraphrase
10. Yeah before that I don't know so now I understand because I see the monitor support and evaluate
11. Mumble also don't smoker reads
12. Oh begin reads
13. I think this smoker whose are adult they cannot give up smoking paraphrase
14. The first time I didn't heared or I don't know some words son now I can when I see

15. the monitor I saw some words I know so I can understand support and evaluate
16. Ok monitor
17. I think straitlaw...this thing come from tobacco it can cause heart disease or something problem inference
18 .I think the strichning such like a drug can harm our body inference
19. Tar fixation
20. I think tar also harm our body this bad thing not good for our health inference
21. Cilia c-il-i-a (spells) (error-silly anne) fixation
22. Carbon monoxide I don't know what's this monitor
23. Yeah monitor
24. I think carbon monoxide this thing come from cigarette it also bad for our health inference
25. So bad for our lungs I think these things is bad(anything else?) inference
26. Before I saw this word I don't know whats meaning but now you explain to me and I
27. saw last sentence they tell me whats this caused some sick about lung so I can guess
28. whats this thing support and evaluate
29. 1000 people die (reads) oh terrible directed attention
30. I think this amount of people who smoke is high opinion
31. That's ok monitor
32. The first time not clear because some things i... some words I can't heard or
33. something some words I don't understand so now I can understand support and evaluate
34. Respiratory system so now I can see the word respiratory system so now I can know
35. whats this the word and how to spell and after that I can check the dictionary to know
36. what's word meaning support and evaluate
37. That's ok monitor
38. I don't know this sentence meaning I don't know this word (chronic coughing) and the
39. grammar maybe looks strange evaluation
40. So how smoking effect the respiratory especially our ways? So I can understand this
41. And this time not some serious grammar mistake I think this easy to read support and evaluate
42. What's emphy...(I explain) ask for clarification
43. Emphysema is a sick illness so I think this come from people smoking and smoking
44. can damage our lung inference
45. Lung cancer fixation
46. Cannot be expelled (reads) I don't know this meaning I just see something destroyed evaluate
47. Yeah monitor
48. I think this part talk about our lung how to work inference
49. So now I know circulactory (circulatory) system and this word how to spell and this sentence support and evaluate
50. meaning yeah(unsolicited) monitor
51. I can easy to understand when I saw the maniter the monitor support and evaluate
52. I think this some if you get this sickness something will X dissapinion- inference
53. In this part of first sentence I could not know clearly to know the meaning- evaluate
54. Yeah first listening now I can guessed when I saw the monitored yeah because I still
55. have some word I don't understand but I can guessed support and evaluate
56. So this sentence tell me what different smoker and nonsmoker paraphrase
57. The smoker more easy to get the heart disease than nonsmokers paraphrase
58. Smoking bad our blod or they .... paraphrase

59. Always feel tired paraphrase
60. Yeah that's necessary if the people don't smoke they don't have a lot of
61. sinicks(sickness) paraphrase
62. Frowned frowned upon by nonsmoker I don't know this word meaning-monitor
63. I think me too I don't like comment
64. I think that's right a lot of people they want to become healthy so they don't like
65. smoke comment
66. Oh monitor
67. The first time I hear the listening I could not catched now ah I know I saw the word
68. and I can ask the teacher whats the meaning about this word support and evaluate
69. So I think nonsmoker they don't like smoke paraphrase
70. Smoker they don't like smell burning tobacco so they keep away from the smoker inference
71. Passive smoke reads
72. Sidestream
73. Sidestream sidestream whats this meaning which came from
74. These sentence tell me what ....
75. Before I hear that .... The first time I can guess the meaning but I could not
76. understand clearly yeah evaluation
77. Oh so I think this can .. when I saw the moniture I think this can help me understand
78. clearly support and evaluate
79. this tell me ... what about passive smoke .....
80. So this tell me what .. what about passive smoke caused some illness ... illness paraphrase
81. I think this describe how ... why the smoker and nonsmoker eh? inference
82. If the passive smoke have the same harmful eh? inference
83. The passive smoke and smoke have the same harmful paraphrase
84. Mm so this more harmful for children paraphrase
85. They will easy to get some illness about respiratory problems about lungs such as
86. respiratory system problems paraphrase
87. Before that I don't know the meaning
88. The second ...second times I see the moniture and listened it can help me understand
89. the meaning support and evaluate
90. During early childhood (reads) so this tell me what smoke effect children grow up
91. yeah that's all paraphrase
92. The first time I know this sentence meaning now when I saw the moniture this more
93. clearly than the first time support and evaluate
94. Near the ven-til-latah area I don't know this meaning monitor
95. Go through a period of withdrawal (reads aloud) directed attention
96. What's this sentence mean? ask for clarification
97. Oh monitor
98. Yeah the first time I don't know this sentence meaning and then I can guessed the
99. meaning evaluation
100. The talk about if the smoker don't have cigarette they will feel their feeling they will
101. feel nervous paraphrase
102. Moond (mood) change paraphrase
103. This talk about how to give up smoking to draw a ... choosing(chewing) gum which have nicotine inside yeah paraphrase
104. This meaning? ask for clarification
105. I know it can help me to easy to understand yeah support and evaluation
106. Ok monitor

107. This meaning some grope (group) help people give up smoking? paraphrase
108. Mm monitor
109. So I understand easily monitor
110. ok monitor

Makiko Protocol 1 listening 1

1. Hmmi couldn't catch some word monitor
2. Appetite something because I was writing evaluate
3. Yeah monitor
4. I wrote X you told me some 3 details appetite something druh druh evaluate
5. Hmm monitor
6. Alcohol fixation
7. Hmm monitor
8. Laughs I couldn't catch some X due to production alcoholways? Because I was
9. guessing evaluate
10. Homemade what was the word ask for clarification
11. No production due to the production of samogen monitor
12. How how do you spell ask for clarification
13. s-a-m-o-ge-n fixation
14. this is homemade alcohol paraphrase
15. hmm monitor
16. ah I don't know cos I was thinking last sentence evaluation
17. hmm monitor
18. keep going command
19. psycho? ask for clarification
20. Psychoactive fixation
21. Yes monitor
22. Mm (understands about glue) monitor
23. Yes monitor
24. Many nouns so I lost some words but already past so I feel never mind because I cant
25. ask usually lecture so I have to be never mind evaluation
26. Business people fixation
27. Huh? monitor
28. I wasnt sure about that word monitor
29. I thought you gave me the answer about business or business something so i was
30. waiting that maybe you give me the answer about substance abuse but you didn't give
31. me evaluate
32. Oh monitor
33. Hmm monitor
34. I still think about this word fixation
35. Hmm monitor
36. My mind changed I have to keep going 2 sentence before I was thinking about why
37. you didn't give me the word and now you gave me the answer so I have to give up so
38. I just keep going to write evaluation
39. I forgot word monitor
40. Many words too many words is too long new words and come together whole
41. sentence I cant write evaluation
42. Usually happen comment
43. Yes monitor
44. Hmm monitor
45. I couldn't imagine a leaf made a drink evaluation
46. Something business people X evaluation

47. If I can imagine the sentence or story I can write but if I cannot imagine this story I
48. can write but if I cannot cannot imagine this story I cannot write evaluation

Akiko Protocol 1 listening 2

1. Hmm monitor
2. Makes it easy to write support and evaluate
3. Hmm yeah monitor
4. This is right? ask for clarification
5. Yeah monitor
6. Yes monitor
7. Mm I can follow cos you said twice and I can see I cannot fo..look for a word before
8. so I have to guess and I have to search in my brain but now I can see
support and evaluate
11. Oh I can fix my vocabulary because I can see support and evaluate
12. Yeah I can check all the time because you speak slowly and I can check each time so
13. yeah evaluation
14. If I read too much I cannot write cos I don't have time but I can understand evaluation
15. Oh I feel I want to I want to write more perfectly other than understand sometimes just
16. I want to keep writing evaluation
17. Hmm monitor
18. Yeah monitor
24. I always happen but I want to write one word I couldn't catch evaluation
25. This situation a little bit shocked to me so I feel I couldn't catch I couldn't I couldn't
26. catch you kill? me evaluation
27. So I 'm thinking about I couldn't catch fixation
28. Not sad what can I do what can I do what can I do comment
29. The sentence no rapt fixation
30. Because I wanted to write perfectly but only one word I couldn't catch I thought
31. Oh I couldn't I couldn't evaluation
32. Rapt rapid fixation
33. High rapid high fixation
34. So I realize now support and evaluate
35. But I write but rapid high this means I have to be rapid paraphrase
36. Hmm monitor
37. Hmm monitor
40. Ah I didn't understand first one first time but I understand right now because this is
41. the second time not watching not checking just second time so I could imagine I could
42. imagine in the brain without looking evaluate(practice effect)
43. Hmm yeah I can check long sen.. word like hallucinogens and mushrooms
44. Mushrooms is easy word but if I have to write its quite long word but I can check
support and evaluate
45. This right word indigenous? I thought business people support and evaluate
46. Ahh really dangerous if I listen lecture its very dangerous assess
47. I don't think like this slow should be very hard to follow because you cut some
48. sentence each time now so I can see where is the finish line but if lecture like a greg
49. doing there very hard to follow evaluation
50. I think second time using is very effective but you'll never have a second lecture in
51. university comment
52.I think student should know before the lecture much easier
53.I do not whats topic I cannot guess but if im going to study in university I know what
54. subject and I have to read a book before the loecture so I can prevent whats going on
55. Ah predict whats going on so maybe I think much more useful

56. Even first lecture even first lecture using this technology if student knows
57. Yeah
58. Because I already know first without this technology
59. So I don't I just guess
60. But student have to know whats going to say whats going to listen today
61. So even the surface is very faster its too moving up I think student can follow only
62. one lecture but now I don't know and I know I knew the topic second one so I can
63. follow easily (building background knowledge) comment

Makiko Protocol Analysis 2 Listening 1

1. Yeah monitor
2. I couldn't some words X something monitor
3. I have to think about chemical sign for O2 or carbon monoxide (mumble) I couldn't
4. catch to ... evaluation
5. I think briefly ...because I never 100% first lecture I always look the note again so I
6. maybe understand 90% and I have to think 100% so ... comment
7. Hemoglobin oh yeah yeah (I understand) monitor
8. Before hemoglobin my imagine is different pronunciation so I couldn't catch it

evaluation

9. Mmh monitor
10. I don't know the syndrome name (emphysema) monitor
11. 3 big words together so I couldn't imagine (stm) evaluation
12. Konic cooking (chronic coughing) I can't imagine in my brain evaluation
13. Its very hard to write evaluation
14. I understand maybe 20% because many many new words evaluation
15. X mmh monitor
16. Mmh monitor
17. Many I don't know I can't write X monitor
18. I can't write because I have to listen I have to get my imagine in my brain but I don't
19. know X words so I can't imagine evaluation
20. Mmh yes mmh monitor
21. Its now better better than before because not many words I don't? know-monitor
22. but ah last one is (attempts to say chronic bronchitis) I can't imagine because I don't
23. know I can't write evaluation
24. Lots of lots of act? Some diamonds? Its very hard to write evaluation
25. I have to know before the lecture otherwise I can't write yeah comment
26. Because when you use big word but if I know big word I don't need to listen
27. everything evaluation
28. (mumble) -
29. mmh monitor
30. mmmh monitor
31. mmh no problem monitor
32. oh (new info) I see monitor
33. mmh I don't know I don't know what's the meaning (frowned upon) monitor
34. pipes I was writing last sentence evaluation
35. bothered? ask for clarification
36. Mmh monitor
37. Mmh mmh I see monitor
38. Mmh (passive smoke) monitor
39. I lost some words so I couldn't write (sidestream) but I don't see 2 words
40. (mainstream/sidestream) so I can't write if I understand I can write if I can't

41. understand I can't write (no guessing) evaluation
42. I don't care about spelling all the time comment
43. Mmh yes monitor
44. I forgot headache the word headache word is quite a long word so I wrote headache
45. and forgot 2 other words evaluation
46. I thought I had to write headache so I forgot 2 words evaluation
47. Mmh monitor
48. Mmh (new info) monitor
49. Mmh monitor
50. Twice the ...(I say yes) ask for clarification
51. Mmh monitor
52. I know the smoking ah subject is all the time in the language school so I know some
53. general one so I can learn X this lecture has some another symptom such as lung
54. cancer another one I have to know everything before the lecture because I make some
55. short one I forgot the word comment
56. Abbrev I have to make otherwise I can't write its too long the symptoms name evaluation
57. I have to think about as soon as possible the smoker and nonsmoker evaluation
58. Mmh monitor
59. Mmh monitor
60. Mmh monitor
61. Mmh monitor
62. Mmh monitor
63. Mmh monitor
64. Mmh monitor
65. Mmh monitor
66. Mmh (musing) monitor
67. Mmh sometimes I have to listen only listen and think about and write
68. I have to sum up the sentence (meaning) evaluation
69. The meaning and everything I have to write otherwise too long
70. Because I have to make clear note so I want to get main point one sentence evaluation

Makiko Protocol Analysis 2 Listening 2

1. Because I can listen (solicited) very easy to see the right word but I can't listen I can't
2. think about anything evaluation
3. It depends the screen if the screen is not correct I have to write uncorrect word so the
4. screen have to be correct I really believe this now evaluation
5. But I can't think about anything evaluation
6. Same as before I don't think about anything X follow the word even not correct X
7. Correct or uncorrect but just keep writing no thinking - evaluation
8. Very easy to write the wrong word but I'm not sure this the right word or not (laughs) evaluation
9. Ok monitor
10. c-i-l-i-a fixation
11. Ah c -
15. I don't compare anything because I don't think about anything but the first one is I
16. think about I think something and then wrote but the second time I don't think about
17. anything comment
18. And dot dot dot what's dot dot dot ask for clarification
19. Oh monitor
20. Could you read from here (points to screen) request

21. I want to write from here so please read again request
22. No monitor
23. Yeah yeah yes monitor
32. I didn't read just write evaluation
33. No (so you don't think you just copy) comment
34. Because its no my language I can't understand straightaway comment
35. But I don't have time to understand this sentence everything but I can read this I mean
36. not read.. look at this screen so this time I can write only write just look at and write
37. and I can read again in the notebook (putting words in her mouth)-evaluate/strategy
38. Yeah I'm looking and writing but this time just looking and no looking at my
39. handwriting just follow the word evaluation
40. Its normal sentence anything not nothing just write comment
41. Hmm monitor
42. No nothing (problem) monitor
43. I haven't look at it because I was here (points to screen) cos I don't listen so I was
44. here and I don't want to say anything because the screen up that's ok
45. Never stop just keep to go? comment
46. What do you think inquiry
47. All the time I can look at the screen but if lecturer ask the question or something I
48. have to write very fast so the lecturer have to be continue to talk evaluate
49. What do you mean (helps?) inquiry
50. It will help very much because I can write everything so I can write I can think later I
51. can sum up later support and evaluate
52. I could understand cilia because I heard before (Cilia =sally anne on screen) evaluation
53. But if this kind of things happen I will lose everything evaluation
54. I lost something.... Nothing monitor
55. I have to write every thing because I cannot .. I cannot think evaluation
56. If I didn't have to write it very easy like tv subtitles say subtitles help but I have to
57. know the word comment
58. It help because sometimes I couldn't catch the word but not this lecture not this one
59. If the more complex one I can understand but maybe I have to know the word
60. meaning subtitle also same comment
Reads
61. Mmh monitor
62. Its very difficult to say I don't have to write because my.. I have to write because easy
63. to understand comment
64. I couldn't catch this (limbs) monitor
65. Yeah monitor
66. I mean I couldn't catch this word monitor
67. So easy to understand easier much better because I can read I don't write I didn't read
68. I can read I have to write note support and evaluate
69. I just look but if I don't have to write note I can understand I have time from here to
70. here (points) evaluation
71. Mmh very easy to understand I can read more detail cos listening cos I can follow the
72. word its much better than first one support and evaluate
73.I can read I can listen form and I can keep reading evaluation
74. Yeah but this note will be not good because I can't sum up comment
75. Mmh monitor
76. Mmh monitor
77. My brain is very confused now because what can I do because I have to write or I

78. have to learn som? Listen? But in lecture comment
79 .I don't understand the lecture but I can read again and if that script is perfect really
80. perfect I can make perfect lecture notes even I don't understand the lecture but I can
81. understand later its very perfect lecture support and evaluate
82. Oh I was wrong the first lecture support and evaluate
83. I can read X X monitor
84. Yeah mainstream and sidestream fixation
85.I can write more detail about the passive smoke contain so really helpful if I read later support and evaluate
86.I couldn't catch before because I can read and I remember this part I couldn't catch
87. but I can read now support and evaluate
88. Mmh this is same as before I think comment(practice effect)
89. Hard to understand but read generally general idea evaluate
90. Yeah monitor
91. Now I stopped to reading because I was X ing X so if I have a pause this part I can
92. read this part evaluation
93. If I have X time I can read X but the second time is more detailed than first one (comparing framework template matched notes) support and evaluate
94. Same as last time and I have to read?write? from hear? comment(practice effect)
95. Now I have to read it from here concentrating on copying the previous part because I
96. can follow onto here so I have a lot of time if part is here so I don't need to listen to
97. lecture because it will come up from here evaluation
98. Mmh same as before I'm writing now comment
99. Here -
100. Really honestly I can read the notebook if I write very well the lecture Its very useful
101. I did in japan for 4 years
102. I don't need to think about anything in lecture I have to write everything professor
103. said in the lecture because only one hour can listen the lecture I don't need to think
104. about anythingi have to write everything and I can write
105. Because japans my language I can write whatever I want
106. The problem but the problems English I have to write I have to read correct word so
107. very helpful
108. If NZ university has this system its very helpful for international student cos we can't
109. understand the lecture so I can write even I don't understand just write write write
110. Very helpful so I can do many exercise too
111. My subject is science so I can listen the lecture whole time and I read notebook again
112. and I can do part of the lecture mathematic things
113 .Its very very helpful everything not only mathematic because I can really understand
114. and I can show the professor what's this word because I made perfect notebook comment

Amber Protocol 1 Listening 1

1. Hmm monitor
2. Ah I cannot write the whole word just a part -for me-is ok evaluate
3. I can't write very quickly maybe because I'm not very good at remembering words evaluate
4. I can follow the pronunciation to write the word but I need thinking evaluate
5. Hmm monitor
6. Mm its ok I just cant when I write the first sentence I miss the second sentence –I'm
7. sorry evaluate
8. Hmm monitor
9. Hmm now its better I just can see? I catch one I feel I catch one point it make me feel
10. better because I catch the last sentence evaluation

11. If I just can catch the first sentence if I just cannot catch the last sentence I will feel
12. very nervous but if I know the last sentence its ok evaluation
13. I feel better comment
14. Hmm monitor
15. Ok monitor
16. This part I just cant (repeats) 3 hundred million people in traditional lands in over 30
17. countries evaluation
18. Hmm I cannot understand monitor
19. I know I heard this kind of things before so it is easy for me to write evaluate
20. Hmm this sentence is ok monitor
21. When I heard final sentence I think I can remember but when I write I cant (laughs) why evaluation
22. Hmm monitor
23. Ok I lost (?) One point about opium in asia (mumbles) evaluation
24. I think you said extremely slow but I cannot catch a very important if it's a test I think
25. I lose mark evaluation

Amber Protocol 2 listening 2

1. Hm monitor
2. Glue fixation
3. Glue fixation
4. G l u glue fixation
5. Ok monitor
6. Hmm monitor
7. Ah-its ok monitor
8. Mm monitor
9. I'm better than him comment
10. Mm monitor
11. To carry oxygen-carry oxygen reads monitor
12.I think the oxygen paraphrase
13. Once I saw this word I can recognize but when I heard the word I could not recognize evaluation
14. People? Should not make these things paraphrase
15. The first its better than me but I think I catch your voice evaluation
16. Deny -
17. I know monitor
18. Yeah monitor
19. Hmm sometime I cannot concentrate so I think that it is good comment
20. I can see the word on the computer for example increase the production by 6%
21. I only know 6% I cant catch increase support and evaluate
22. Hmm monitor
23. High I know monitor
24. I find it interesting sometime I find it can make very silly mistake- just like me comment
25. Yeah monitor
26. Hmm monitor
27. 7-8 million fixation
28. 7 to 8 million ok monitor
29. hmm monitor
30. private not fixation
31. I think this private evaluate

32. Previous – I think sometimes it can help me support and evaluate
33. It also can help but in a different way because I find I'm better than him sometimes
34. It makes me feel confident support and evaluate
35. Street children yeah fixation
36. Cycle active fixation
37. Psycho fixation
38. Oh monitor
39. Hmm monitor
40. Hmm monitor
41. Change fixation
42. I think when first you use this I feel very uncomfortable I cannot concentrate but now
43. I think I'm really enjoying to use it comment
44. Some word maybe its not difficult but I cannot recognize when I saw it –oh its this
45. one support and evaluate
46. Cheap available (reads) fixation
47. Rapid high fixation
48. Oh I see (reads) mumbles monitor
49. Sniff fixation
50. Yeah monitor
51. Indigenous peoples –people not peoples fixation
52. another land before (reads) fixation
53. hmm I think I just listen I didn't thinking –if I thinking I shall know what this was- evaluate
54. (reads) mumbles- linguistic that's right monitor
55. mumbles-this just because I don't know this word when I listen a lecture I always feel
56. that I need to know word comment
57. this so it can help me I can just copy this word and use dictionary support and evaluate
58. religious practice fixation
59. I heard politics evaluate
60. Sometimes I hear wrong word maybe its difficult evaluate
61. That word is not difficult but I think its difficult so I don't know –maybe my brain
62. lead my ear to hear another word –not your word its my word –my imagine I think but
63. his type of thing often occur evaluate
64. Hallucinogen fixation
65. Oh like you do some drug paraphrase
66. Hmm monitor
67. I know what it means but I don't know exactly this word monitor
68. (reads) chewed monitor
69. this time second time so I can more relax and I can fell more... support and evaluate
70. also I don't know exactly word second time is ok support and evaluate
71. maybe I'm very naughty I find it make a silly mistake I feel confident comment

Amber Protocol 2 Listening 1

1. Mmh monitor
2. mm monitor
3. Sorry how many males I miss this one ask for clarification
4. Mmh monitor
5. mmh monitor
6. mmh monitor
7. mm monitor
8. mmh monitor
9. mmh monitor

10. mm monitor
11. mmh monitor
12. mmh monitor
13. mmh monitor
14. mmh monitor
15. Now I have some problem about the vocabulary I not very understand I just have
16. some problem about the vocabulary because I don't understand whats the mean
evaluation
17. Mmh monitor
18. Ha not so good also vocabulary now in other? Maybe I sometime miss some word but
19. not a very serious problem assess
20. mmh monitor
21. mmh monitor
22. mmh monitor
23. I think its ok I can understand all not all evaluation
24. Almost can understand all the things you talk about (monitor) but some detail I miss
25. because of vocabulary but its quite interesting evaluation
26. Mmh monitor
27. hm monitor
28. May I ....i just know in somewhere some people died because of konic (chronic)
29. coughing paraphrase
30. Coughing is like (mimics cough) but before I don't understand what that means just
31. from your woice (voice) just some word I don't know if its right or not-paraphrase
32. Mmh monitor
33. Maybe I also have some problem like I talk about last time mm because I speak in
34. wrong form I can't understand what the word evaluation
35. Hm (laughs) monitor
36. I missed the ...at first I missed so I just not catch last form word mm evaluation
37. Mm monitor
38. limbs fixation
39. mmh monitor
40. mmh monitor
41. mmh monitor
42. mmh monitor
43. mmh monitor
44. mmh monitor
45. yeah monitor
46. mmh monitor
47. mmh monitor
48. mmh monitor
49. mmh monitor
50. mmh monitor
51. houf? comment
52. almost fine mmh monitor
53. Miss word again also that problem about heart disease and 6 people died because
54. between this I missed evaluation
55. When I write the word the next word sometime I cannot catch because I focus on
56. write the word correctly evaluation
57. Mmh monitor
58. mmh yeah ok monitor
59. The first one they got and more kanasis (bronchitis) what I can't understand so I just 60.
write the word kanasis then its ok evaluation

61. Mmh monitor
62. yeah monitor
63. mmh monitor
64. mmh monitor
65. yeah monitor
66. I didn't catch what and get more people giving up tobacco ah I think I don't know just
67. maybe because I don't exactly know what the word means I just give up.. pass-assess
68. Mmh monitor
69. mmh monitor
70. This time I use too long time to think about how to write nicotine (nicotine) patch so I
71. miss another things I feel not so good evaluation
72. I think the big problem for me is vocabulary so always don't understand-evaluate
73. If I don't understand how I can write ..i can't because I don't know what that means
74. If I write maybe all also wrong also cannot recognize from my notes its useless you
75. know evaluation
76. When I listen to the first time listening always feel not so good because you.. the
77. second time time is much better because I have something to help me comment

Amber Protocol 2 Listening 2

1. Easy this part is quite easy so I can deal with this evaluation
2. Percent yeah? ask for clarification
3. Ok very fast but because I listen before I can remember something very fast I can
4. remember something and write the same thing down evaluation
5. I don't think slow down is very good because if you keep very fast I can concentrate if
6. always very slow I will think I will get lazy I think my brain will get lazy-comment
7. Addictive drug/its not very difficult maybe I just think I will didn't understand and let it
8. past assess
9. I sometime think that word is difficult I let it past but its not exactly difficult just my
10. brain let me do this assess
11. Its ok this is ok increase the hydrate (error)...heart rate ok evaluation
12. substance/ do you think this word is right/co/ca/yeah ok (reads)-ask for clarification
13. Word again so I can follow this screen I can learn from this machine about the word support and evaluate
14. Cilia c-i-l-i-a fixation
15. Its just machine (machine error) comment
16. Ok before this sentence I know nothing at all now maybe a little but still many word I
17. cannot understand what that means exactly support and evaluate
18. Respiratory don't know (I explain) monitor
19. Resparatory(respiratory) monitor
20. Very important word carbon monoxide monoxide assess
21. I don't know that names mm but I know carbon but not monoxide evaluation
22. Body cell hmm ok monitor
23. That's ok/ before I don't know the resparatory (respiratory) but now I can recognize
24. this word so I can write very easily think about how to say(laughs) support and evaluate
25. Chronic just one word I don't know the means now I can understand mm so its no
26. problem for these sentence I can understand support and evaluate
27. Yeah I know breathe(laughs) monitor
28. No maybe go on/no I don't know this word and I can't guess (Xidea?) maybe(I explain emphysema) evaluation
29. Yeah destroyed and extra mucus/what is mucus ask for clarification
30. yeah hmm monitor
31. Yeah cannot expel means go out yeah asks for clarification

32. ah ok hmm/
33. ok do you think this word is right block for bronchi/block what means block the bronchi
ask for clarification
34. I know its very serious I must X far away from the smoker keep far away(laughs)
35. I think sometime I cannot recognize the word but I know that is a thing was blocked
36. by the cancer cell evaluation
37. I don't know this is very serious or not but I think I can know something in the lung
38. was blocked evaluation
39. do you think is enough if I don't know what that word means inquiry
40. Hmm monitor
41. hmm yeah monitor
42. oh yeah monitor
43. Tingling sensation whats that means ask for clarification
44. the first time I heard the word is fat this machine also recognize it/its right fat?(reads)
evaluation
45. Ok oh yeah yeah monitor
46. the first time I catch the increase the risk of heart attack evaluation
47. this time I miss X because I focus too much on fat but I have this machine to help me
48. is good support and evaluate
49. if I don't have much words maybe just listen sentence not very good than the first
50. time not the same as first time because I think too much on fat I want to know is right
51. or not evaluation
52. I miss last sentence I just know the cut almost a third/yeah/(reads) evaluation
53. This sentence just say the general situation so is very easy for me to make notes
evaluation
54. This time I cannot catch a word about the passive smoke include I just know the 3
55. kind of things (sidestream smoke etc.) but cant recognize what that means evaluation
56. mmh oh 2 the second one is more easy because its side strain smoke-evaluate
57. The same situation I know the meaning but I have no time to write notes evaluation
58. I can know some bad things into the lungs include nicotine and carbon monoxide but I
59. have no time to make notes evaluation
60. do you think I need to write the whole word? ask for clarification
61. maybe that's a problem I always want to write a whole word comment
62. Its very easy meaning why does it use very difficult words to X tell it/and serious they
63. use konic (chronic) why? inquiry
64. When I think when I listen something I focus too much on the last 4 or 5 words so I
65. miss the most important thing for example in this situation I miss 50000 people/I think
66. its very important word but I miss evaluation
67. Oh I always can't remember the last word you said evaluation
68. hmm but cannot remember the word before that so I think I need more practice ok
comment
69. I think I will have some problem about the word I just learning I just learnt comment
70. I just ask you and know the meaning so I cant write them correctly so i.. my I just
71. think its too difficult for me to write but now its getting better because I can know the
72. meaning evaluation
73. when you read I can know the meaning but I can't write so after that if I can't write I
74. will forget evaluation
75. I mean when I finish listening I go back to my notes I cannot remember what this
76. word if I don't have the machine to help me to write the word correctly(spelling)
support and evaluate
77. And I also want to know what that means (bronchitis-I explain) ask for clarification

78. I think this time is easy/ this word I don't know what the means so I just.. I thinking
79. this means in this area so the smoker can smoke in this area because the air can go in
80. and out very quickly evaluation
81. I've got this I still think I have a problem I know the mean but I don't have time to
82. write them evaluation/notetaking
83. when I write the word maybe because I practise comment
84. when I write I always spelling wrong I need to correct many time so it's a waste of
85. time (spelling) comment
86. I know how to spelling it I always write the wrong word (wrong spelling) comment
87. yes this time I can't understand the method they use/ evaluation
88. still the same problem I have no time to write comment
89. before I write I must thinking for first I listen your voice evaluation
90. When you speak I can know the meaning and then the X/ evaluation
91. then you speak this time I always have the same problem I know the meaning/
92. ah I just say the X/
93. I make notes and then I thinking how to spelling then write so its last too long time to make notes because I need to know the meaning and think the spelling and write/ evaluation/notetaking
94. always 4 steps comment
95. first heard then know the meaning and then thinking then write- evaluate/notetaking
96. Not good I think because I think for many people they don't need this system how to
97. spell I can use the screen now I can use mm in the future not for first
98. in the future I don't have this to help me what can I do?
99. you use it its very good I like this very much because it can help me- support and evaluate

Arina Protocol Listening 1

1. Ok monitor
2. Mm monitor
3. Ok monitor

(Long stretch of silence)

4. russain ok monitor
5. I can't understand again in Russian monitor
6. Alcohol (repeats) fixation
7. Ok some words is difficult to me ..elicit evaluate
8. This is … paraphrase
9. Mm monitor
10. Control control to previous control in Russia paraphrase
11. Ok I couldn't understand this monitor
12. The government are associate mm I think about because ah 2 or 3 words mm re you
13. told me in one sentence I tink about the meaning of 2 this word and understanding the
14. sentence is difficult for me yeah because of 2 or 3 words we need-evaluate
15. Yes carry on
16. Yes monitor
17. Normal functioning of the brain fixation
18. Mm a little-because normal functioning of the brain tell me about some number of
19. people and children - paraphrase
20. and I mix up for organizing them into this category or here the topic sentence or _too
21. fast here I feel you fast evaluate/notetaking
22. Mm you mean in developing country they use glue and because its cheaper and
23. available and use from the plastic bag? - paraphrase
24. I didn't understand- monitor

25. Ah ok monitor
26. Ok monitor
27. Mm alcohol fixation
28. This is a number of the children they use marijuana and alcohol in over 70 countries 3
29. million in over 70 countries- paraphrase
30. 17 or 70 ask for clarification
31. ah ok 70 monitor
32. I can't understand the meaning of this indigest if I see this word I could –this
33. number—what talking about- evaluation
34. Living on land before... settler comes have to ... indigest..you give me an idea about
35. the indiginest now yeah ok - evaluation
36. Ok monitor
37. Mm monitor
38. Yes .. in the world financial monitor
39. I think this sentence was long for me because I think this is important I have to read
40. some character about the indiginest ...they live..- assess
41. You give me a definition about this and now I want to write about their personality
42. how they live where they live ..they are god at financial status and so on-embellish
43. I couldn't understand (psychoactive) - monitor
44. Mm 2 or three word that I can understand it gave me the meaning of your speech here- reconstruction
45. Nutritional qualities- fixation
46. I can't understand after that traditionally? monitor
47. Mm monitor
48. Ok monitor
49. Mm monitor
50. Yes monitor
51. Thank you
52. I miss some part that you told me because when you talk about some ah indigest
53. traditional thing some specific word that you use I couldn't understand I miss some – evaluation
54. yeah monitor
55. again you read for me but I couldn't understand again sorry- monitor

Arina Protocol 1 Listening 2

1.Yeh at first reading the tobacco of the reading is the ability of the blood to carry oxygen
2. and I suppose that you told me that tobacco for the blood pleasure something like that I 3. misunderstand what you say from the first reading now when I look at this I found it- support and evaluate
4. Yes the government don't care about this news in –looking developing country- paraphrase
5. but at the first time I didn't notice that the government in developing country supposed
6. to be called governments- support and evaluate
7. Mm monitor
8. Ok monitor
9. Cigarette industry (reads) fixation
10. Ah yeah now when I saw the cigarette I now know you talk about cigarette but at the
11. first time I suppose its still you talk about tobacco in India and not developing
12. country? India is a developing country?- support and evaluate
13. ok monitor
14. oh this is the first mm .. that sentence that I didn't understand consumption alcohol in
15. former soviet union its right?- ask for clarification

16. I can understand it-(reads) monitor
17. oh (high) monitor
18. illicit- fixation
19. ok- monitor
20. ok- monitor
21. ok I understand- monitor
22. mm monitor
23. oh very fast –linking the drinking of alcohol-oh now I understand but I cant organize
24. to write immediately-now I can understand but as good as be number 1 I cant
25. organize- evaluation/notetaking
26. ok- monitor
27. mm monitor
28. yeah news cycle- monitor
(machine reads psychoactive as cycle –interferes with comprehension)
29. this is cycle you mean cycle ask for clarification
30. recycle fixation
31. ah psychology p s y c ho (spells) fixation
32. I can understand better but my writing I think I cant – evaluation/notetaking
33. I have to- and immediately write so it would be the same same as number 1when I ?
34. focus on the screen I understand better ?- evaluation/notetaking
35. I forgot to write some important words I found it in there you know but now I'm
36. better understanding the text- support and evaluate
37. I think this (weak notetaking) is a personal problem its maybe my problem because if I
38. read very fast oh economic or develop just important word or topic sentence ?
39. information I can't chose immediately- evaluation/notetaking
40. Now I understand and the children sneef it from the plastic bag I misunderstanded
41. sneef and I suppose that something they mixed with the plastic bag and they use the
42. drug that contain the plastic bag but oh now I can imagine the sneef on the plastic bag
43. and now I understand better ok- support and evaluate
44. Cocaine where is the ?- ask for clarification
45. Yes I know this one was clear the first reading as well- evaluation
46. Mm indigenous - fixation
47. Yeah monitor
48. On their land or on the land?- ask for clarification
49. Ah ok- monitor
50. yes I knew this one from the first- evaluation
51. mm monitor
52. yes that's right its something from the first ? I understand- evaluation
53. yeah monitor
54. the summer hunter I didn't understand summer hunter- monitor
55. and gatherers are living in the rainforest - paraphrase
56. this sentence at the first reading I couldn't understand-
57. summer's hunter I suppose summer hotter you know-and gatherer or living in the
58. rainforest –rainforest I suppose main forest- but here now I'm fine- support and evaluate
59. yes this one I have problem- monitor
60. yeah most indigenous grope (improve pron??) share a common heritage-paraphrase
61. ah ok this one I couldn't understand but I now I read I understand- support and evaluate
62. was indigenous grope? Ah the first one share a common heritage –I didn't understand
63. common heritage- monitor
64. indigenous grope heritage just this I suppose but now a common heritage mm
65. yes this paragraph that you said the first reading I couldn't understand totally I
66. couldn't understand just I guess now I understand- support and evaluate

67. what's this?- ask for clarification
68. highly -fixation silence (noting information)
69. nutritional qualities? Ok I know - monitor
70. nutritional qualities use in religious (mumble)-
71. oh spirit world I suppose scurit word first time- support and evaluate
72. spirit I think I found another ting the first one –spirit means souls?- ask for clarification
73. Widely .. widely used ah now I understand mm
74. The first time the first reading I couldn't understand god's?meaning what you mean
75. about this sentence have been widely I heard wildly not widely and used to help and
76.widelys totally changed the meaning of the sentence now I saw the widely --oh used to
77.help people communicate with the spirit world so because of this like this like this
78. word another meaning I suppose totally different (laughs)- support and evaluate
79. Mm monitor
80. And about whats that kap I didn't understand the cap and now I notice that you said
81. use for drink and – evaluation
82. Ok I didn't understand a cheap way to stop the pangs of hunger pangs of hunger I
83. didn't understand (mumbles)- monitor
84. I cant understand this right now- monitor
85. The first reading was very difficult among people who already have anemia about the
86. previous word heard?? And now because of lek of iron –iron ok- support and evaluate
87. I didn't understand and now I totally understand ability of the blood to carry oxygen
88. Its totally different blood pleasure - support and evaluate

Arina Protocol 2 Listening 1

1. Insecure- fixation
2. In social situations?- ask for clarification
3. In social? Ok monitor
4. Mm can you read it again- ask for clarification?
5. Mumble-repeats
6. Ah ok I want to…
7. Mm I couldn't understand something some teens- monitor
8. Can you explain please ah read again?- ask for clarification
9. Some teens oh yeah(told her not to ask for a reread)- monitor
10. Ok monitor
11. Hmm mm I know I understand- monitor
12. What's the meaning of this- ask for clarification
13. Ah I couldn't understand tobacco net (contains nicotine) the word net I couldn't hear- evaluation
14. 2 words was strange I couldn't understand the meaning of / I know what's the effect
15. but this 2 word a little bit strange - evaluation
16. talking about the affect/effect- paraphrase
17. cilia that's a new word (?)/ but it could be a organ of the body I think-inference
18. hmm (ok)- monitor
19. I totally understand what's the meaning of this but I can't write it down all of them
20. (?) but I really understand the process of smoking the blood and (?) evaluation/notetaking
21. hmm monitor
22. ah I couldn't the word respiratory system- monitor
23. I couldn't understand what is 10 times smoker and non smoker- monitor
24. I don't know the end chronic (?) so I don't know the meaning exactly-evaluate
25. Hmm the same word repeated and I know that destroyed that part-evaluate
26. Now I understand- monitor

27. Mm monitor
28. Xtra? I couldn't hear it- ask for clarification
29. Ok this I understand- monitor
30. Circulatory system I know - monitor
31. Blood float? To limbs/ limbs I don't know that- monitor
32. Blood float/ float- fixation
33. Tinkling/ I couldn't understand tinkling- monitor
34. ah I have to see the spelling but I understand- evaluation
35. Clag I couldn't understand clag- monitor
36. Hmm/yes- monitor
37. Yes - monitor
38. Cut almost a ...third/I couldn't understand this word- monitor
39. therd (third)is ah ok- monitor
40. Ooh monitor
41. Yes- monitor
42. Hmm monitor
43. Yes same problem (refer to text)- evaluation
44. The definition of passive smoke was so fast so if the passive smoke was first and then
45. the definition I could remember it better- evaluation
46. Signs?(sidestream) side smoke?- fixation
47. And smoke fixation
48. Yes- monitor
49. Yes I totally understand- monitor
50. ok monitor
51. yes/- monitor
52. hmm I couldn't understand this be pool- monitor
53. Yes/ok- monitor
54. I don't understand this word .....sinus/hmm- monitor
55. Growth just allergy I couldn't understand and then doesn't have (?)/more likely to be
56. allergy/ -
evaluation
57. During pregnancy more likely to have allergy/this familiar word I write it down and
58. the other word couldn't write- evaluation/notetaking
59. Preteect off? I couldn't understand this word- monitor
60. ok monitor
61. ok monitor
62. hmm- monitor
63. awareness- fixation
64. Wareness oh- I have to see the spelling cos I know the meaning that sentence-evaluate
65. Yes/yes/hmm- monitor
66. Withdraw (?) yes dep.. and now in another sentence I now understand withdrawl
67. Because all the word in this sentence was easy to understand and I understand all the
68. word but the first one/ because the first one.. the first letter I hear the withdrawl and it
69. wasn't actually in the middle of the sentence because I mostly..
70. I understand the meaning from the previous sentence and next sentence/ this sentence
71. help me to understand the withdrawl/hmm- evaluation
72. Bodies gradual I couldn't understand/ gradual or dradual?- ask for clarification
73. yes I understand /yeah/yeah- monitor
74. Sugarless gum/yeah sugarless/hmhm- monitor
75. flush tox- fixation
76. Tox I don't know I have to write /tak? (laughs) I see the word- evaluation
77. Flush tox taks (laughs)- fixation

78. Tobacco/stimulate I know the word- monitor
79. oh yeah I couldn't understand this sentence- monitor
80. Avoid alcohol and bit related between alcohol and smoking/I fel that you changed the
81. topic/and I don't know what the related between/ a little bit I mixed up/ avoid alcohol- evaluation
82. mm monitor
83. I don't understand/plan to resist/writing up?- monitor
84. Yes/yes- monitor
85. hmm I couldn't understand this because I make a delay to checking about that
86. pervious sentence- evaluation
87. talk about the substitute smoking and eating/ and then somehow they smoke they quit
88. smoke because of the DIET?- paraphrase
89. Sorry I make delay and miss this sentence- evaluation

Arina Protocol 2 Listening 2

1. Oh yes now I understand because the first time the first listening I couldn't understand
2. exactly the teenage woman is (not greater) and now I understand-support and evaluate
3. Hmm monitor
4. Ok this strong messages the first lecture I couldn't understand/ now strong messages in
5. media support and evaluate
6. Yes insecure in social situations/now I saw it I understand because I hear the insecure
7. in social situations and now I see the or and feel and now I know the meaning of the
8. sentence- support and evaluate
9. That's alright the spelling of puffing? Ok/yes the first listening the puffing I suppose
10. that's the other way/ I have to write it and a little bit confused/puffing right?
11. Peer is right?/ I couldn't understand the first lecture and now … I can understand the
12. peer pressure- support and evaluate
13. Unhealthy effects/ I hear the affect not effects now I understand it- support and evaluate
14. Hmm/yeah most adult smoke who began smoking as teens/ as teens I couldn't
15. understand the first lecture and now I understand teen/as teens are still add..because
16. are addicted/now I understand the reason (?)- support and evaluate
17. Is right? The spelling of stimulant I suppose stimulant and now I re..now I see it/ I
18. suppose stimulant its different- support and evaluate
19. Yes/heart rate heart rate/ the first time I couldn't understand and now I understand
20. heart rate-separate yes- support and evaluate
21. Carcinogens ah ok I understand now cos of the spelling/ its familiar I already look at it- support and evaluate
22. Oh cilia/destroy cilia/ cilia part of organ now I know- support and evaluate
23. Yes/colourless ah yes I didn't understand this colorless now I … yes I know I saw it
24. Hmm monitor
25. this process the first time I couldn't have enough time because I concentrate to the
26. odorless and the other word and now I pass it immediately and now I write it down
27. this process of the blood attacks to human- support and evaluate
28. Hemoglobin yes hemoglobin/I didn't understand hemoglobin and now he …(?)
29. questions spelling- support and evaluate
30. Ok
31. yes
32. yes- monitor
33. ah the first listening I didn't understand some of the diseases affecter respiratory
34. system and now I understand diseases – support and evaluate
35. I don't know the word respiratory system and now I understand diseases affect

36. respiratory system- support and evaluate
37. I don't know the word resperatory system but about the previous sentence I..i
38. understand it/now I know what's talking about- evaluation
39. Chronic bron... oh I couldn't understand chronic bron/this is ah could be noun
40. yeah/ evaluation
41. yeah now I understand (reads and mumbles)- support and evaluate
42. Occur-correct repeat???/I have no idea about sentence- monitor
43. oh now I understand it (putting pieces together to form whole) yeah because the cilia
44. destroyed tar causing to coughing yeah/now I understand/because the explanation
45. more complete and I can see- support and evaluate
46. I didn't .... If I didn't see the word if I hadn't seen the word and I didn't tink about the
47. explanation about maybe cilia/if another word that is a problem all the sentence I
48. didn't care about it at the first listening and now when I see this ..../oh power to the
49. tar and causing the coughing oh now I understand what's destroy and what's talking
50. about- support and evaluate
51. (reads) oh yeah at first when you read I couldn't tink I didn't tink didn't care about the
52. plumenary emph... and now the tiny air sacs in the lunge (lung) through which
53. oxygen is absorbed and the definition is completely I understand it when I saw it and
54. read it quickly- support and evaluate
55. oh I have one problem --one one part cilia and this one with (?)/oh I just understand
56. the lunge cannot explete(expel)- evaluation
57. no I don't understand this word- monitor
58. black bronchee? Bronchi/ fixation
59. ok I think black block the bronchi is not familiar to me but (mumble?)/now I
60. understand because of the following sentence move to the lunge-its moving
61 something- support and evaluate
62. I couldn't understand the first lecture/ the first time constrict the vessel which cuts
63. down on blood flow (?)- evaluation
64. Ah I write the limp and this is limb is different/ now I understand/ I write I wrote limp
65. but now limb support and evaluate
66. Ah tinkling I didn't understand it/ now I understand because after that sensation
67. tinkling sensation yeah?/ before sensation I now understand what you mean (reads)- support and evaluate
68. The first time I couldn't understand the contribute to fat (?)- evaluation
69. I have no idea about clobber/ ah clog now I understand it- monitor
70. Yes I understand it the first time and now/- evaluation
71. Ah stroke I didn't understand stroke and now I understand it- support and evaluate
72. hmm I couldn't understand the first time the meaning of and now I read it ok and now
73. I understand what's the meaning of a third and the first time
74. the third is number or a word what are you talking about it I didn't understand the meaning of the sentence and now yes- support and evaluate
75. Pipes ah ok now I saw it I understand cigars
76. yes because smoke cigarettes have toi be comma/ I suppose that you said cigarette
77. pipes
78. when I ... the second the third word conjoined with and/ cigarette pipe and cigar support and evaluate
79.Many (mumble) ok (reads) yes I understand the first time- evaluation
80. oh burning tobacco sorry the first time I suppose mmm.... Another thing I suppose
81. boring tobacco I hear boring tobacco burning yeah- support and evaluate
82. Ah being exposed being exposed I couldn't understand the first time/being expose
83. (reads) ah now I understand lead to the same problem- support and evaluate
84. Mainstream I couldn't understand this word mainstream and now I understand it

85. mainstream because of the spelling/blown out by (?) and side strem sidee ah
86. mainstream sidestream now I understand it- support and evaluate
87. The first time I couldn't understand what you are talking about passive smoking but
88. the variety of passive smoker is the point (reads)- support and evaluate
89. two definition now I understand but I don't have enough time to write it
90. down- evaluation/notetaking
91. Ah harmful ingredient I couldn't understand the first time and now ingredient
92. harmful ingredient now I understand what's the meaning of this sentence- support and evaluate
93. Parts of a smoke is this right?(machine error)- ask for clarification
94. yes I understand it the first time- evaluation
95. Oh annually I hear diannury and now (di?)annually I know it- support and evaluate
96. What's the affected affected by- ask for clarification
97. Ah ok- monitor
98. Ah I didn't understand the last sentence and now I understand it (twice as likely)- support and evaluate
99. Children of cigarette smokers-oh this is very important subject- assess
100. nearly twice twice I couldn't understand it (reads)
101. now exactly understand it
102. this is compare compiration (comparison) its very useful to see this than and twice
103. than- support and evaluate
104.(mumble) ok monitor
105.the same ok monitor
106. more serious ok serious sinus fixation
107. the spelling of mine was wrong I know the word but of your pronunciation but this is
108. the first time I see it/I knew it but I didn't know the spelling- support and evaluate
109. now I understand developmental problem I didn't understand the first time now I
110. understand- support and evaluate
111. an allergy/I just realize the allergy in this sentence about affect the pregnancy mum
112. allergies (?) yes when they deliver the baby it can have allergy and yes mental
113. problem affect of cigarette- support and evaluate
114. to pick up speak up oh the first time I suppose that pick up- support and evaluate
115. (reads) ah now I understand/ none smoker have the right to speak up to protect the air
116. by breathe
117. oh yes the right this right of non smoker now I understand hm- support and evaluate
118. I knew ventilated but I didn't know its spelling now I understand- support and evaluate
119. Oh awareness/awareness I didn't know I didn't understand awareness- support and evaluate
120. Ok I know knew this/hmm/(reads) this sentence is during the period of the person
121. might feel nervous but this withdrawal I didn't hear the but/ but this withdrawal do
122. not last long so I didn't understand everything without but/in the contrasted/hmm/ oh
123. now I understand cos the your're talking about withdrawal and the definition/ your
124. explanation about about the gradual withdrawal now I understand/you're talking
125. about the gradual withdrawal now I understand/ I hear the gradual reduced to amount
126. of nicotine I totally couldn't understand the first time- support and evaluate
127. I understand the first time- evaluation
128. routine ah this is right trigger/I didn't know I hear trainger trainger but now
129. trigger- support and evaluate
130. And read it just talking about the steps of quitting cigarette and end of sentence
131. support the (?) of these steps for smoking/ the person who smoke but the first hearing
132. I couldn't understand this sentence that support this step that support all the text not
133. these steps especial steps - support and evaluate

Stephen Protocol 1 Listening 1

1. tobacco use	fixation
2. I don't understand tobacco use	monitor
3. Tobacco yes	monitor
4.?	clarify
5. Risky or whisky	clarify
6. Risky	monitor
7. I don't this word	evaluate
8. Pang-pain?	clarify
9. Forgot his pain it more easy to ?	paraphrase
10. Yes more high blood same	paraphrase
11. Anyway not	----------
12. Cut blood cycle	paraphrase
13. Yes I understand some baseball player chewing tobacco	monitor
14.?	
15. sixty yeah	monitor
16. India childrens 10% have a smoking and one more time	paraphrase
17. Some old people smoking 67%	paraphrase
18. Russia	fixation
19. Homemade alcohol	fixation
20. Why does the Russian people to take alcohol	clarify
21. Why most Russian people more drink other than country	clarify
22. Yes I don't understand	monitor
23. Mm	monitor
24. Oh yeah more and more Russians people drink ?	clarify
25.(?)	
26. some percent	fixation
27. government don't touch over alcohol person	paraphrase
28. just feel	comment
29. im just think Russia people drink like USA person	paraphrase
30. I just this understand talk about addiction	evaluation
31. Add.....addiction	fixation
32. Are	
33. Homeless ah homesick	monitor
34. Homeless is similar homesick?	clarify
35. No	answer
36. yeah he all day stay home and feel	paraphrase
37. homeless person more drink ?	clarify
38. 8 or even 7 children something do I don't understand	monitor
39. mm I have guess some people trade regularly other country to get some country	
40. mm	monitor
41. mm	monitor
42. indigenous	fixation
43. what indigenous?	clarify
44. I don't know	monitor
45. I don't understand what it means indigenous and many word I don't understand	evaluation
46. (?) I don't understand word	evaluation

Stephen Protocol 1 Listening 2.

1. addiction fixation
2. yeah monitor
3. some wondering because this program just lead and follow the sentence I just looking evaluation
4. yes almost I understand but I write this sentence and you tell me again I more clearly
5. understand monitor
6. this is some people ? clarify
7. correct word you read its more clearly support and evaluate
8. smoking fixation
9. you say about the smoking and 3 millions people everyday die paraphrase
10. and poor people often use tobacco for forget their pain paraphrase
11. mm the reason of people to smoke I think is a ? paraphrase
12. reduce my weight and one more paraphrase
13. blood ah blood fixation
14. blood cutting oxygen blood oxygen paraphrase
15. yeah developing country make a decision paraphrase
16. and ah anyway company make cigarette deliver that people smoking more and more paraphrase
17. more understand I cant ? this monitor
18. I didn't understand so I read the sentence (pause 14) monitor
19. I don't understand sandwich (samogen) evaluation
20. Sampogen fixation
21. Anyway in Russia people more drink alcohol paraphrase
22. Russia people more higher the number is rising and one of the problem they don't how paraphrase
23. many people alcohol paraphrase
24. something I read the sentence and some memory before I heard that (LTM) S+E
25. you first read the sentence I have memory yeah (pause 8) evaluation
26. all over the world people drink ? (pause 15) clarify
27. many people looking for freedom or social success so they drink paraphrase
28. I just guess evaluation
29. I just heard the easy word for example children homeless and number and I don't 30. understand but I read the sentence is some lose evaluation
31. Fast fast late fixation
32. You say fast and is not fast so don't match so I confusing evaluation
33. I don't match you read and following the sentence evaluation
34. I read the street children but this screen not right and I have to memory your voice but
35. I forgot next sentence evaluation
36. Im just container and plastic bag evaluation
37. Im suggest is not illegal something and they don't ..... paraphrase
38. They do something ? illegal something clarify
39. But the sentence I have read but I don't understand because many words I don't know evaluation
40. Rapid very fast comment
41. The same people ----------
42. Many children using illegal thing I just understand evaluation
43. Yeah monitor
44. What is indigenous what does it mean? clarify
45. Land fixation
46. Yes separate indigenous people foreign people paraphrase
47. Indigenous people I heard many time but I don't understand evaluation
48. I didn't know indigenous meaning evaluation
49. Ah monitor

50. Yeah monitor
51. First im just heard its not easy and I didn't know many word and he said so fast and 52. im just guess some usual ..some word evaluation
53. The second time I read the sentence
54. The sentence is not fast and I have to remember same time I have to read so not clear
55. but more than first time support and evaluate

Stephen Protocol 2 Listening 1

1. Mm monitor
2. 3 thousand people fixation
3. 8 degree over people smoke ½% less 80 years smoking people ½% increase the
4. woman smoking paraphrase
5. yes some researcher find why young people smoking paraphrase
6. I don't know insec....insecure evaluation
7. Maybe they to smoking is to help their mind for relaxing paraphrase
8. Some advertising office ah make some bad advertising paraphrase
9. Teenager think that smoking is not too bad paraphrase
10. Immediately..now speaking paraphrase
11. Yeah immediately something do paraprase
12. I don't understand (condropt) monitor
13. Anyway young people start to when they are young but ah didn't to give up to smoke paraphrase
14. Its not too hard monitor
15. Mm
16. The smoke cigarette have nicotine and it make some high blood cycle paraphrase
17. Yes stimulate monitor
18. Is this done bad thing and it make people more violent paraphrase
19. Yes I understand monitor
20. Oh im just oh understand cancer ..cancer evaluation
21. Anyway they some bad thing part of cigarette paraphrase
22. Yes cigarette have many kind of bad thing paraphrase
23. Yes some I don't know the word but it make blood..blood damaging evaluate
24. Yeah I understand monitor
25. Yeah the responsible ?..... monitor
26. ? of smoker and non-smoker but I don't know first two word evaluation
27. I don't understand monitor
28. Yeah the influence of damage of body paraphrase
29. I don't understand many means and word evaluation
30. It is not difficult sentence but I don't understand people sentence I hard to guess evaluation
31. Long cancer...long fixation
32. Lung ah yeah I understand evaluation
33. Something destroy something paraphrase
34. They do thing over to lung paraphrase
35. Circulate system yeah big problem paraphrase
36. Most big problem circulate paraphrase
37. I don't understand monitor
38. Feet no --------
39. Anyway if ? the damage I don't understand the word evaluation
40. Anyway you say another reason in addition evaluation
41. I guess just in addition you say you will another reason just I guess evaluation
42. Condition heart attack paraphrase

43. Oh condition more bad paraphrase
44. Ah yeah understand monitor
45. Smoker undone smoker paraphrase
46. Understand monitor
47. Blood press… paraphrase
48. Smoking make …… paraphrase
49. Smoking place our blood paraphrase
50. Anyway if play bad damage give up smoking after some change but… paraphrase

Stephen Protocol 2 Listening 2

1. Yeah I understand monitor
2. 20% female daily smoker paraphrase
3. most young people start 18 years people paraphrase
4. yeah monitor
5. why do teens start to smoke and the major reason is feeling paraphrase
6. (reads) social situations fixation
7. I can understand because I can see the text support and evaluate
8. Yeah I understand monitor
9. Peer pressure that mean is delight (pleasure?) clarify
10. People say about smoker paraphrase
11. Some people teens believe that (reads) fixation
12. Mm monitor
13. Smoking when they give up to smoke their health is more people more good paraphrase
14. Yes I understand to give up smoking is not easy to very hard monitor
15. I don't understand some word but this sentence maybe talking about the reason of too
16. hard give up smoking evaluation
17. I don't understand I don't know stimulary but its increase the action evaluation
18. Anyway bad things paraphrase
19. Another bad thing nicotine and explain the blood damaging paraphrase
20. I just guess nicotine I know people nicotine evaluation
21. How can act in our health so I can guess first time but more understand this time support and evaluate
22. Another reason I just guess cancer-causing evaluation
23. Anyway this sentence explain some people sentence evaluation
24. Tar and lung im just know lung meaning and destroying evaluation
25. Im just guess some damage evaluation
26. Smoking contain carbon monoxide and colorless odorless poisonous gas more clear paraphrase
27. people fixation
28. I could see the text support and evaluate
29. I don't understand clearly but I have to guess because carbon monoxide is one of bad
30. thing so I have to guess evaluation
31. This sentence reason of bad thing evaluation
32. Yes I understand monitor
33. Yeah I don't know respiratory system but it is explain some disease effect so I have to
34. understand evaluation
35. Yeah most smoker have damage more than non-smoker paraphrase
36. Anyway this sentence explain chronic bronchis (bronchitis) evaluation
37. This sentence more clear because many word I understand evaluation
38. And pulmonaria is some damage the lung and destroy body paraphrase
39. Yes understand (errors) monitor

40. Breathe fixation
41. Anyway another reason destroy our body I don't understand evaluation
42. Yes most word I know but this meaning some confusing evaluation
43. Smoking have lots of problem paraphrase
44. Circulatory is some counting electronic tool? clarify
45. circulate fixation
46. no monitor
47. ? I don't understand monitor
48. yeah I understand nicotine is a bad thing and this sentence explain about nicotine evaluation
49. (reads) blood vessel I don't understand evaluation
50. heart attack yes I understand evaluation
51. I heard heartatack first time evaluation
52. I heard the same word one word evaluation
53. Yes I understand monitor
54. I understand but its not easy because when I reading the text its more easy Support and evaluate
55. But the listen I quickly think but its not easy evaluation
56. When I read the text I haven't enough time to think and change my own language
57.but…
58. But
59. But if I have some ….
60. I don't know the word its not useful I have to guess the previous sentence
61. When I listening I don't have enough time to guess evaluation
62. another sentence quickly comes up
63. if I learned just before class its first time to heard and first time I don't understand but
64. I see the text now I understand support and evaluate
65. some sentence this time I heard before
66. first heard sentence I had to guess so its waste of my time so I heard another sentence
67. and forget before meaning …before sentence
68. I didn't perfectly transport meaning evaluation

Appendix L

The number of increase in matches, improved spelling, vocabulary and phrase noting in table 3

Name	Lecture	Listenin g	Match			Improved spelling			Improved vocabulary and phrases
			US	LLP	CH	Wr	LLP	CH	
Benny	1	2	1	1	0	9	+2	-7	+4 words +5 phrases
	2	2	0	4	+4	1	+1	0	+9 words +2 phrases
	3	2	3	7	+4	3	+2	-1	+7 words +6 phrases
	4	2	2	9	+7	2	+1	-1	+5 words +1 phrase
	5	2	2	5	+3	2	+1	-1	+5 words +2 phrases
total	5		8	26	+18	17	+7	-10	+30 words +16 phrases

Name	Lecture	Listening	Match			Improved spelling			Improved vocabulary and phrases
			US	LLP	CH	Wr	LLP	CH	
Resa	1	2	3	1	-2	3	+3	0	+6 words +3 phrases
	2	2	1	2	+1	2	+2	0	+1 word+ 1 phrase
	3	2	2	5	+3	2	+1	-1	+4 words +5 phrases
	4	2	0	4	+4	4	+4	0	+8 words +13 phrases
	5	2	2	4	+2	4	+4	0	+4 words +2 phrases
total	5		8	16	+8	15	+14	-1	+23 words+24 phrases

Name	Lecture	Listening	Match			Improved spelling			Improved vocabulary and phrases
			US	LLP	CH	Wr	LLP	CH	
Makiko	1	2	11	15	+4	11	+2	-9	3 words +2 phrases
	2	2	4	6	+2	6	+3	-3	+1 word +2 phrases
	3	2	9	14	+5	10	+5	-5	+1 word +7 phrases
	4	2	9	12	+3	25	+11	-14	+2 words + 4 phrases
	5	2	3	9	+6	7	+3	-4	0 words +2 phrases
total	5		36	56	+20	59	+24	-35	+7 words+17 phrases

Name	Lecture	Listening	Match			Improved spelling			Improved vocabulary and phrases
			US	LLP	CH	Wr	LLP	CH	
amber	1	2	6	4	-2	10	+3	-7	+6 words +3 phrases
	2	2	4	4	0	5	+2	-3	+3 words + 1 phrase
	3	2	6	12	+6	5	+4	-1	+9 words + 4 phrases
	4	2	7	10	+3	6	+6	0	+9 words +4 phrases
	5	2	1	8	+7	4	+3	-1	+7 words 0 phrases
total	5		24	38	+14	30	+18	-12	+34 words+12 phrases

Name	Lecture	Listening	Match			Improved spelling			Improved vocabulary and phrases
			US	LLP	CH	Wr	LLP	CH	
Stephen	absent	2	0	0	0	0	0	0	0 words 0 phrases
	2	2	1	1	0	0	0	0	+3 words 0 phrases
	3	2	3	5	+2	6	+1	-5	+3 words +6 phrases
	4	2	1	6	+5	8	+4	-4	+7 words + 2 phrases
	5	2	1	3	+2	4	+2	-2	+3 words +3 phrases
Total	5		6	15	+9	18	+7	-11	+16 words +11phrases

Name	Lecture	Listening	Match			Improved spelling			Improved vocabulary and phrases
			US	LLP	CH	Wr	LLP	CH	
Arina	1	2	4	6	+2	14	+2	-12	2 words + 3 phrases
	2	2	4	7	+3	10	+5	-5	+3 words +1 phrase
	3	2	7	8	+1	8	0	-8	+1 word +5 phrases
	4	2	5	9	+4	13	+7	-6	+1 word +3 phrases
	5	2	5	6	+1	6	+2	-4	0 words +3 phrases
total	5		25	36	+11	51	+16	-35	+7 words+15 phrases

Appendix M

Raw data from notetaking samples from main study

Benny Lecture 1

Name	Topics	Key information	Additional information	Total score
Benny	Same	+6.9%	-6.7%	+2.7%

Increase/Decrease Table Lecture 2

Name	Topics and subtopics	Key information	Additional information	Total
Benny	+10%	+6.8%	-8%	+16%

Increase/Decrease Table Lecture 3

Name	Topics and subtopics	Key information	Additional information	totals
Benny	+28.6%	+34.3%	+25%	+30.4%

Increase/Decrease Table Lecture 4

Name	Topics	Key information	Additional information	Total score
Benny	+62.5%	+13.8%	+16.4%	+26.6%

Increase/Decrease Table Lecture 5

Name	Topics	Key information	Additional information	Total score
Benny	+33%	+11.6%	+20%	+18.6%

Main Study Lecture 1 Nicotine Results:

Name	Listening	Topics N=13	Key information N=46	Additional information N=15	Total score N=74
Benny	1	2 (15.38%)	2 (4.3%)	2 (13.35%)	6 (8.1%)
	2	2 (15.4%)	5 (10.9%)	1 (6.7%)	8 (10.8%)

Benny Lecture 1 Listening 1

Name	Lst	Match	Spelling	Vocabulary building
Benny	1	1 unclear match with spelling mistakes Smoking-bad hitbits	smorking smork smorker cansa firend nctin nigutin len cansa	

Benny Lecture 1 Listening 2

Name	Lst	Match	Spelling	Vocabulary building
Benny	2	1 clear match effects of smoking	smoking smoker	effects (psychological dependence) (risk of developing drawbacks) strategies addictive (hight blood pressure) tobacco (increased alertness) (human health) note: correct syntax copied: smokers are at higher risk of developing high blood pressure

Lecture 2

Name	Listening	Topics and subtopics N=10	Key information N=29	Additional Information N=12	Total N=51
Benny	1	1 (10%)	1 (3.4%)	2 (16%)	4 (8%)
	2	2 (20%)	9 (10.2%)	1 (8%)	12 (24%)

Benny Lecture 2

Name	Listening	Match	Spelling	Vocabulary and phrase building
Benny	1	0	Testing	
	2	1. memory-encoding 2. memory-2 types 3. strategy-PQRST 4. PQRST-explanation	Test	(long-term memory) (brain system) test preview state read question encoded information verbal visual

Lecture 3

Name	Listening	Topics and subtopics N=14	Key information about topics and subtopics N=32	Additional information N=20	Totals N=66
Benny	1	3 (21.4%)	2 (6.3%)	1 (5%)	6 (9%)
	2	7 (50%)	13 (40.6%)	6 (30%)	26 (39.4%)

Lecture 3

Name	Listening	Match	Spelling	Vocabulary and phrase building
Benny	1	1. sleep-caicle 2. rem sleep-description 3. dream-list of facts	caile (cycle) phyciolgol balagoical	
Benny	2	1. sleep-description 2. sleep-biological need 3. circadian rhythms-functions 3. theories-2 types 4. sleep-cycles and stages 5. rem sleep-explanation 6. dreams-facts 7. dreams-meaning	cycles biological	rejuvenate (physical restoration) theory (rapid eye movement) emits (visual imagery) (lucid dreaming) cultures and traditions have given dream interpretation an important place in their belief systems interpretation conciousness self-awareness (circadian rhythms) stages

Lecture 4

Name	Listening	Topics	Key information	Additional information	Total score
Benny	1	2 (12.5%)	3 (10.3%)	1 (6.6%)	6 (10%)
	2	12 (75%)	7 (24.1%)	3 (23%)	22 (36.6%)

Benny Lecture 4

Name	Listening	Match	Spelling	Vocabulary building
Benny	1	1 Phobia-example 2.drug-drawback	peybour clockephybia	
	2	1.anxiety disorder-description x3 2.anxiety disorder-types x3 3.phobia-examples 4.compulsions-description 5.therapy-types 6.modeling-techniques 7.flooding-additional information 8.psychotropic drugs-description 9.drawback-description	claustrophobia	(obsessive-compulsive) disorder symptoms rigid repetitive behaviour

Lecture 5

Name	Listening	Topics and subtopics N=12	Key information about topics and subtopics N=26	Additional Information N=5	Totals N=33
Benny	1	3 (25%)	1 (3.8%)	0	4 (9.3%)
	2	7 (58%)	4 (15.4%)	1 (20%)	12 (27.9%)

Lecture 5

Name	Listening	Match	Spelling	Vocabulary and phrase building
Benny	1	1.phybina-types 2.sechphydina-explanation	Migke phybina	
	2	1.abnormal-description 2.phobias-types 3.mood disorders-explanation 4.mood disorders-fact 5.schizophrenia-fact	phobia	(mood disorders) psychological (disrupt everyday life) schizophrenia delusions beliefs agoraphobia

Increase / Decrease Lecture 1

Name	Topics	Key information	Additional information	Total score
Resa	+15.4%	-4.4%	-13.35%	-3.1%

Increase/Decrease Table Lecture 1

Name	Topics and subtopics	Key information	Additional information	Total
Resa	+20%	-13.6%	+8%	-2%

Increase/Decrease Table Lecture 3

Name	Topics and subtopics	Key information	Additional information	Totals
Resa	+14.3%	+6.2%	+10%	+9.1%

Increase/Decrease Table

Name	Topics	Key information	Additional information	Total score
Resa	+56.2%	+27.6%	+40%	+38.4%

Increase/Decrease Table

Name	Topics	Key information	Additional information	Total score
Resa	+50%	+7.7%	0	+16.3%

Main Study Lecture 1 Nicotine Results:

Name	Listening	Topics N=13	Key information N=46	Additional information N=15	Total score N=74
Resa	1	2 (15.4%)	5 (10.9%)	2 (13.35%)	9 (12.2%)
	2	4 (30.8%)	3 (6.52%)	0	7 (9.1%)

Lecture 1 Listening 1 Resa

Name	Lst	Match	Spelling	Vocabulary building
Resa	1	3 matches 1 .smoking-dangerous - 400 die-health problem 2. When stop smoke-headache-20-25% quick smoking-smoker group counselling 3. Gave up-benefit	necotain helth cigarlet	

Lecture 1 Listening 2 Resa

Name	Lst	Match	Spelling	vocabulary building
Resa	2	1 clear match Smoking – dangerous – cancer-high blood pressure-While there were fewer matches her number 3 notes had a pancake effect or a levelling out of information	nicotine health cigarettes	(psychological effect) (actual drug) decision physical worldwide millions (sleep disturbances) stress wellbeing

Lecture 2

Name Resa	Listening	Topics and subtopics N=10	Key information N=29	Additional Information N=12	Total N=51
	1	1 (10%)	8 (27.2%)	0	9 (18%)
	2	3 (30%)	4 (13.6%)	1 (8%)	8 (16%)

Resa Lecture 2

Name	Listening	Match	Spelling	Vocabulary and phrase building
Resa	1	1. memory-systems	menmory sistem	
	2	1. memory-operation 2. strategy-PQRST	memory system	preview (memory system)

Lecture 3

Name	Listening	Topics and subtopics N=14	Key information about topics and subtopics N=32	Additional information N=20	Totals N=66
Resa	1	3 (21.4%)?	1 (3.1%)	0	4 (6.1%)
	2	5 (35.7%)	3 (9.3%)	2 (10%)	10 (15.2%)

Increase/Decrease Table Lecture 3

Name	Topics and subtopics	Key information	Additional information	Totals
Resa	+14.3%	+6.2%	+10%	+9.1%

Lecture 3

Name	Listening	Match	Spelling	Vocabulary and phrase building
Resa	1	1. reason for sleep-recover 2. Rem sleep-brain-deep sleep	rydum reserch	
Resa	2	1. biological sleep-natural rhythm 2. circadian rhythms-description 3. sleep cycles-explanation(basic) 4. rem sleep-description 5. dream-content	rhythm	(biological sleep) (natural rhythm) (sleep cycle) (circadian rhythms) pattern (rem sleep) psychologically brainwave function

Lecture 4

Name	Listening	Topics	Key information	Additional information	Total score
Resa	1	1 (6.3%)	0	0	1 (1.6%)
	2	10 (62.5%)	8 (27.6%)	6 (40%)	24 (40%)

Increase/Decrease Table

Name	Topics	Key information	Additional information	Total score
Resa	+56.2%	+27.6%	+40%	+38.4%

Lecture 4 Resa

Name	Listening	Match	Spelling	Vocabulary and phrase building
Resa	1	0	enjeant povience povier reaxcesion	
Resa	2	1. Types of anxiety-3 names 2. Phobias-types 3. Systematic desensitisation-3 phases 4. Drug therapies	anxiety phobias phobia relaxation	(generalized anxiety) (obsessive-compulsive disorder) agoraphobia claustrophobia (social phobia) (ways to cope) (symptoms of anxiety) (common types) (phobic fear) (psychodynamic therapy) (behaviour therapy) (systematic desensitization) phases therapist modelling (drug therapies) techniques (phobic disorder) anti-anxiety anti-psychotic (permanent solution)

Lecture 5

Name	Listening	Topics and subtopics N=12	Key information about topics and subtopics N=26	Additional Information N=5	Totals N=33
Resa	1	3 (25%)	0	1 (20%)	4 (9.3%)
	2	9 (75%)	2 (7.7%)	1 (20%)	11 (25.6%)

Increase/Decrease Table Lecture 5

Name	Topics	Key information	Additional information	Total score
Resa	+50%	+7.7%	0	+16.3%

Resa Lecture 5

Name	Listening	Match	Spelling	Vocabulary and phrase building
Resa	1	behaviour-fact povier (phobia)-1 type	povier mentol pysical angropovier	
	2	behaviour-fact anxiety-fact phobia-2 types social phobia-description	phobia mental physically agoraphobia	(mood disorders) psychological (disrupt everyday life) schizophrenia delusions beliefs

Increase / Decrease Lecture 1

Name	Topics	Key information	Additional information	Total score
Makiko	+15.4%	+2.6%	+6.6%	+8.1%

Increase/Decrease Table Lecture 1

Name	Topics and subtopics	Key information	Additional information	Total
Makiko	+10%	+17%	+8%	+14%

Increase/Decrease Table Lecture 3

Name	Topics and subtopics	Key information	Additional information	Totals
Makiko	+7.1%	+12.7%	+20%	+13.6%

Increase/Decrease Table Lecture 4

Name	Topics	Key information	Additional information	Total score
Makiko	0	+31.1%	-33.4%	+6.6%

Increase/Decrease Table Lecture 5

Name	Topics	Key information	Additional information	Total score
Makiko	0	+23.1%	+20%	+11.7%

Main Study Lecture 1 Nicotine Results:

Name	Listening	Topics N=13	Key information N=46	Additional information N=15	Total score N=74
Makiko	1	6 (46.1%)	22 (47.82%)	3 (20%)	31 (41.9%)
	2	8 (61.5%)	25 (50.4)	4 (26.6%	37 (50%)

Increase / Decrease Table Lecture 1

Name	Topics	Key information	Additional information	Total score
Makiko	+15.4%	+2.6%	+6.6%	+8.1%

Makiko Lecture 1

Name	Listening 1	Matches	Spelling	Vocabulary and phrase building
Makiko	1	1. Nicotine-addictive 2. Smoke-dangerous 3. Reason-teens 4. Passive smoke-banned 5. Target-teens 6. Chemicals-tar-nicotine 7. Nicotine-affects body 8. Short term effects 9. Withdraw-symptoms 10. Strategies-counselling 11. Health benefits	necotine lan turm symption dipression heat rate discomfatble counceling adactive behiviour counceling	
	Listening 2	1.nicotine-bad habit 2. smoking-addictive 3. dangerous-diseases 4. passive smoke-banned 5. reasons-teen 6. target-teens 7. addictive-difficult to quit 8. chemicals-tar – nicotine 9. lan cancer-150,000 deaths 10. effect on body 11. short term effects 12. withdrawal-symptoms 13. strategies 14. psych support-counselling 15. medical therapy-nicotine patch	addictive depression	(Blood pressure) medical dependence dependent (related diseases)

Lecture 2

Name	Listening	Topics and subtopics N=10	Key information N=29	Additional Information N=12	Total N=51
Makiko	1	4 (40%)	12 (40.8%)	0	16 (32%)
	2	5 (50%)	17 (57.8%)	1 (8%)	23 (46%)

Increase/Decrease Table Lecture 2

Name	Topics and subtopics	Key information	Additional information	Total
Makiko	+10%	+17%	+8%	+14%

Makiko Lecture 2

Name	Listening	Match	Spelling	Vocabulary and phrase building
Makiko	1	1. memory-description 2. memory-2 systems 3. strategy-PQRST 4. memory-inprisve (implicit)	vidual verbaly inprisve resarch privew crutial	
	2	1. memory-description 2. memory-2 systems 3. visual memory-description (form mental picture) 4. strategy-PQRST 5. memory-implicit 6. memory-research (clearer)	visual verbal preview	coded (encoded) (forming mental picture) (number of operations)

Lecture 3

Name	Listening	Topics and subtopics N=14	Key information about topics and subtopics N=32	Additional information N=20	Totals N=66
Makiko	1	9 (64.3%)	6 (18.6%)	2 (10%)	17 (25.8%)
	2	10 (71.4%)	10 (31.3%)	6 (30%)	26 (39.4%)

Increase/Decrease Table Lecture 3

Name	Topics and subtopics	Key information	Additional information	Totals
Makiko	+7.1%	+12.7%	+20%	+13.6%

Lecture 3

Name	Listening	Match	Spelling	Vocabulary and phrase building
Makiko	1	1. sleep-definition 2. sleep-biological need 3. scadion lizm (circadian rythms)-functions 4. paspective-types 5. sleep-stages and sycoles 6. lem sleep-explanation 7. dreaming-description 8. dreaming-physiology 9. dreams-content	contiasness uncoopelative scadion lizm paspective hybenation solibol restaration exostion sycole	
Makiko	2	1. consciousness-definition 2. sleep-definition 3. sleep-biological need 4. circadian rhythms-function 5. perspectives-2 types 6. sleep-stages and cycles 7. rem sleep-description 8. rem sleep-explanation 9.nrem-description 10. brain waves-description 11. dreaming-definition 12. dreams-content 13. lucid dreaming-description 14. dreams-meaning	conciousness circadian rithms restoration cerebral cycle	(circadian rythms) (cerebral restoration theory) (brain's cortex) repetitive (alpha waves) (delta waves) (altered state of conciousness) (lucid dreaming)

Lecture 4

Name	Listening	Topics	Key information	Additional information	Total score
Makiko	1	14 (87.5%)	7 (24.1%)	6 (40%)	27 (45%)
	2	14 (87.5%)	16 (55.2%)	1 (6.6%)	31 (51.6%)

Increase/Decrease Table Lecture 4

Name	Topics	Key information	Additional information	Total score
Makiko	0	+31.1%	-33.4%	+6.6%

Lecture 4

Name	Listening	Match	Spelling	Vocabulary +phrase building
Makiko	1	1. anxiety disorder-3 types 2. phobia-examples 3. social phobia-definition 4. obsession-definition 5. cerapy-types 6. cerapy types-examples 7. drug cerapy-results 8. drug cerapy-examples 9. drug cerapy-drawbacks	exicise opcecive- compocise phesiology acrofobia crastfobia sweting pani attacs fobic obsecion comportion phyco dinamic cerapy phyco cerapy assosiatioc analysit cerapist modering floating obserbe composive retual effect brain face	
Makiko	2	1. anxiety disorder-2. definition 3. anxiety disorders-1 type+?? 4. physical symptoms-examples 5. phobias-types 6. types-explanations 7. therapy-types 8. types-explanations 9. techniques-explanations 10. phases-described (badly) 11. drug therapy-names 12. drawbacks-described	phobias acrophobia therapy free association dream analysis therapy obsession compulsive flooding affect brain phase	(physiological symptoms) (based on the view) phases exposed (confused thinking) (cause physical dependency)

Lecture 5

Name	Listening	Topics and subtopics N=12	Key information about topics and subtopics N=26	Additional Information N=5	Totals N=33
Makiko	1	7 (58%)	2 (7.7%)	0	9 (21%)
	2	7 (58%)	8 (30.8%)	1 (20%)	16 (32.7%)

Increase/Decrease Table Lecture 5

Name	Topics	Key information	Additional information	Total score
Makiko	0	+23.1%	+20%	+11.7%

Makiko Lecture 5

Name	Listening	Match	Spelling	Vocabulary and phrase building
Makiko	1	anxiety disorder-phobia phobias-types scatfiria (schizophrenia)-explanation	anzeity fobia agrophobia dipressed intence scatfiria ilusion	
	2	mental illness-explanation anxiety-fact phobia-types simple phobia-description agoraphobia-description mood swings-fact major-facts x2 bipolar-explanation schizophrenia-description	anxiety phobia schizophrenia	(bipolar disorder) (mood swings)

Increase / Decrease Lecture 1

Name	Topics	Key information	Additional information	Total score
Amber	Same	+21.8	+13.4	+16.2%

Increase/Decrease Table 2

Name	Topics and subtopics	Key information	Additional information	Total
Amber	+20%	+13.6%	+8%	+14%

Increase/Decrease Table Lecture 3

Name	Topics and subtopics	Key information	Additional information	Totals
Amber	+42.9%	+40.6%	No change	+28.7%

Increase/Decrease Table 4

Name	Topics	Key information	Additional information	Total score
Amber	+56.2%	+38%	+9.7%	+35%

Increase/Decrease Table 5

Name	Topics	Key information	Additional information	Total score
Amber	+25%	+26.9%	+20%	+33.4%

Main Study Lecture 1 Nicotine Results:

Name	Listening	Topics N=13	Key information N=46	Additional information N=15	Total score N=74
Amber	1	6 (46.1%)	11 (23.91%)	4 (26.6%)	21 (28.4%)
	2	6 (46.1%)	21 (45.7%)	6 (40.0%)	33 (44.6%)

Increase / Decrease Lecture 1

Name	Topics	Key information	Additional information	Total score
Amber	Same	+21.8	+13.4	+16.2%

Lecture 1 Listening 1 Amber

Name	Lst	Match	Spelling	Vocabulary building
Amber	1	1. Why smoke?-cool 2. effect nicotine –blood brain stimulation 3. Withdraw-uncomfortable 6-18 hours - 20-20% quit more than a year 4.Cemicle-tar and nicotine 5.Strategie-give up-on own-in groups 6. health benefit-enjoy everyday	nicotin strategie addctive heat atacs cemicle teenange headach dependend with draw	

Lecture 1 Listening 2 Amber

Amber	Lst	Match	Spelling	Vocabulary building
		1. Why smoke? 2. Chemicals 3. Withdraw 4. strategies	addictive dependent withdraw	crave drug increase (give up) benefit program (better concentration) (gain weight) related

Amber Lecture 2

Name	Listening	Topics and subtopics N=10	key information N=29	Additional Information N=12	Total N=51
Amber	1	2 (20%)	8 (27.2%)	0	10 (20%)
	2	4 (40%)	12 (40.8%)	1 (8%)	17 (34%)

Increase/Decrease Table

Name	Topics and subtopics	Key information	Additional information	Total
Amber	+20%	+13.6%	+8%	+14%

Amber Lecture 2

Name	Listening	Match	Spelling	Vocabulary and phrase building
Amber	1	1. memory-operation x3 2. memory-systems x2 3. strategy-KQRST 4. memory-implxs	implxs sys incoded retrived lusary	
	2	1. memory-operation x2 2. strategy-PQRST+add. info. 3. memory-implicit 4. research-results?	retrieved luxury	(mental picture) review research perform

Amber Lecture 3

Name	Listening	Topics and subtopics N=14	Key information about topics and subtopics N=32	Additional information N=20	Totals N=66
Amber	1	5 (35.7%)	11 (34.4%)	1 (5%)	17 (25.8%)
	2	11(78.6%)	24 (75%)	1 (5%)	36 (54.5%)

Increase/Decrease Table Lecture 3

Name	Topics and subtopics	Key information	Additional information	Totals
Amber	+42.9%	+40.6%	No change	+28.7%

Lecture 3

Name	Listening	Match	Spelling	Vocabulary and phrase building
Amber	1	1.sleep-biologycal need 2.sleep-reason for 3.sleep-cycles 4.dreams-description 5.dreams-contents 6.dream-meaning	biologycal secadian reason brain cotecx hybonation	
Amber	2	1.sleep-definition 2.sleep-biological need 3.circadian rythms-functions 4.sleep-reason for 5.sleep-perspectives 6.sleep-cycles and stages 7.nrem-explanation 8.nrem sleep-results 9.dreams-timing of 10.dreams-physiology 11.dreams-content 12.dreams-meaning	biological circadian rythms hibernation	recovery (physical restoration) repetitive visual (lucid dreaming) symbolism (brain activity) conciousness theories (bodily rythms) temperature patterns process

Amber Lecture 4

Name	Listening	Topics	Key information	Additional information	Total score
Amber	1	3 (18.8%)	3 (10.3%)	2 (13.3%)	8 (13.3%)
	2	12 (75%)	12 (48.3%)	3 (23%)	29 (48.3%)

Increase/Decrease Table Lecture 4

Name	Topics	Key information	Additional information	Total score
Amber	+56.2%	+38%	+9.7%	+35%

Lecture 4 Amber

Amber	Listening	Match	Spelling	Vocabulary
	1	1.anxiety-fear 2.physical-stomach ulcers 3.phobias-types 4.phobias-explanation x2 5.physical-panic attacks 6.treatment-technique 7.treatment-example	ensiaty feel association behiviour sismedicen mudling	
	2	1.anxiety-description 2.anxiety-examples 3.phobias-types x2 4.examples-explanations 5.psychodynamic therapy-techniques 6.systematic desensitization-phases 7.flooding-description 8.modeling-description 9.drugs-effect 10.drugs-drawbacks	anxiety free association behavioural systematic modeling	symptoms compulsion claustrophobia physiological (elevated heart rate) obsession (free association) (dream analysis) eliminating alleviate (physical dependency) side-effect drawbacks

Lecture 5

Name	Listening	Topics and subtopics N=12	Key information about topics and subtopics N=26	Additional Information N=5	Totals N=33
Amber	1	6 (50%)	2 (7.7%)	0%	8 (24.2%)
	2	9 (75%)	9 (34.6%)	1 (20%)	19 (57.6%)

Increase/Decrease Table Lecture 5

Name	Topics	Key information	Additional information	Total score
Amber	+25%	+26.9%	+20%	+33.4%

Lecture 5 Amber

Amber	Listening	Match	Spelling	Vocabulary and phrase building
	1	1.abnormal-comment	agop fritened sigle phinia	
	2	1.abnormal behaviour-comment 2.abnormal behaviour-description 3.phobia-types 4.type x1-example major depressive 5.disorder-description 6.schizophrenia-description 7.schizophrenia-symptoms 8.symptoms-explanation	agoraphobia frightened schizophrenia	adjust agoraphobia proportion interfere reaction delusion hallucinations

Increase/Decrease Table Lecture 2

Name	Topics and subtopics	Key information	Additional information	Total
Stephen	+10%	same	-8%	Same

Increase/Decrease Table Lecture 3

Name	Topics and subtopics	Key information	Additional information	totals
Stephen	+7.2%	-3.2%	+5%	+1.5%

Increase/Decrease Table Lecture 4

Name	Topics	Key information	Additional information	Total score
Stephen	+2.5%	+44.8%	+20%	+30%

Increase/Decrease Table Lecture 5

Name	Topics	Key information	Additional information	Total score
Stephen	+33%	0%	+40%	+14%

Main Study Lecture 1 Nicotine Results:

Name	Listening	Topics N=13	Key information N=46	Additional information N=15	Total score N=74

Stephen Lecture 2

Name	Listening	Topics and subtopics N=10	key information N=29	Additional Information N=12	Total N=51
Stephen	1	1 (10%)	4 (13.6%)	1 (8%)	6 (12%)
	2	2 (20%)	4 (13.6%)	0	6 (12%)

Increase/Decrease Table Lecture 2

Name	Topics and subtopics	Key information	Additional information	Total
Stephen	+10%	Same	-8%	Same

Stephen Lecture 2

Name	Listening	Match	Spelling	Vocabulary and phrase building
Stephen	1	1. memory-processing	0	
	2	1. memory-2 systems	0	operate habit testing

Stephen Lecture 3

Name	Listening	Topics and subtopics N=14	Key information about topics and subtopics N=32	Additional information N=20	Totals N=66
Stephen	1	3 (21.4%)	4 (12.5%)	0	7 (10.6%)
	2	4 (28.6%)	3 (9.3%)	1 (5%)	8 (12.5%)

Increase/Decrease Table Lecture 3

Name	Topics and subtopics	Key information	Additional information	Totals
Stephen	+7.2%	-3.2%	+5%	+1.5%

Lecture 3

Name	Listening	Match	Spelling	Vocabulary and phrase building
Stephen	1	1. sleep-reason 2. sleep cycle-description 3. dreaming-description	ricover ciycle natuatal bilagikal rythem sence	
Stephen	2	1. sleep-description 2. natural rhythms-function 3. sleep-reason 4. rem sleep-description 5. rem sleep-description	recovery	(a process of) (sleep patterns) self-aware focusing visual (wave activity) (rem sleep) (nrem sleep) (western culture)

Lecture 4

Name	Listening	Topics	Key information	Additional information	Total score
Stephen	1	3 (18.8%)	1 (3.5%)	0%	4 (6.7%)
	2	7 (43.8%)	12 (48.3%)	3 (20%)	22 (36.7%)

Increase/Decrease Table Lecture 4

Name	Topics	Key information	Additional information	Total score
Stephen	+2.5%	+44.8%	+20%	+30%

Lecture 4

Name	Listening	Match	Spelling	Vocabulary building
Stephen	1	1. forbease-social phobia	forbease porbia seraphic oxkroporbia prading tecknic modering angiouty	
Stephen	2	1. anxiety-examples 2. phobias-definition 3. social phobia-types 4. therapy-flooding +modeling 5. systematic desensitization-explanation 6. antipsychotic drugs-help reduce symptoms	phobias agoraphobia therapy flooding	unreasonable flooding claustrophobia (dream analysis) (systematic desensitization) relaxation relieve reduce anti-psychotic

Lecture 5

Name	Listening	Topics and subtopics N=12	Key information about topics and subtopics N=26	Additional Information N=5	Totals N=33
Stephen	1	3 (25%)	0	0	3 (7%)
	2	7 (58%)	0	2 (40%)	9 (21%)

Increase/Decrease Table Lecture 5

Name	Topics	Key information	Additional information	Total score
Stephen	+33%	0%	+40%	+14%

Stephen Lecture 5

Name	Listening	Match	Spelling	Vocabulary and phrase building
Stephen	1	1.phobia –types	mentol anxienty phycialy exprience	
	2	1.behaviour-description 2.behaviour-opinion 3.anxiety disorder-types	mental anxiety	(mental illness) psychologically (anxiety-based disorders) agoraphobia (reduced ability to function) schizophrenia

Arina Main Study

Increase / Decrease Lecture 1

Name	Topics	Key information	Additional information	Total score
Arina	Same	+8.7%	Same	+5.4

Increase/Decrease Table Lecture 2

Name	Topics and subtopics	Key information	Additional information	Total
Arina	+10%	+40.8%	-8%	+12%

Increase/Decrease Table Lecture 3

Name	Topics and subtopics	Key information	Additional information	Totals
Arina	+14.3%	-9.3%	+20%	+4.5%

Increase/Decrease Table Lecture 4

Name	Topics	Key information	Additional information	Total score
Arina	+27.5%	-3.4%	+33.3%	+16.6%

Increase/Decrease Table Lecture 5

Name	Topics	Key information	Additional information	Total score
Arina	-25%	+7.6%	+20%	0%

Main Study Lecture 1 Nicotine Results:

Name	Listening	Topics	Key information	Additional information	Total score
Arina	1	7 (53.8%)	12 (26.08%)	2 (13.35%)	21 (28.4%)
	2	7 (53.8%)	16 (34.8%)	2 (13.35%)	25 (33.8%)

Increase / Decrease Lecture 1

Name	Topics	Key information	Additional information	Total score
Arina	Same	+8.7%	same	+5.4

Lecture 1 Listening 1

Name	Lst	Match	Spelling	Vocabulary building
Arina	1	1. Health risk 2. Reasons 3. Effect of nicotine on body 4. Strategy	siggarette dangeras canser loung smok nicotin long cancer affect/effect addictet denger anxios consentrat headach consentration	

Lecture 1 Listening 2

Name	Lst	Match	Spelling	Vocabulary building
Arina	2	1. Cigarettes are addictive-crave 2. Reasons 3. Chemical-tar nicotine 4. Effect of nicotine Short term effect 5. Strategies 6. Health risk	cigarette dangerous	(heart disease) (blood pressure) passive crave (cold turkey)

Lecture 2

Name	Listening	Topics and subtopics N=10	Key information N=29	Additional Information N=12	Total N=51
Arina	1	3 (30%)	9 (10.2%)	1 (8%)	13(26%)
	2	4 (40%)	15 (51%)	0	19 (38%)

Increase/Decrease Table

Name	Topics and subtopics	Key information	Additional information	Total
Arina	+10%	+40.8%	-8%	+12%

Ari Lecture 2

Name	Listening	Match	Spelling	Vocabulary and phrase building
Arina	1	1. memory-operation 2. memory-systems 3. strategy-PQRST 4. memory-implicit	artical visiual retrid visiolal verbaly mentol privewe reaserches incoded implesit	
	2	1. memory-operation+long-term 2. memory storage 3. memory-systems 4. strategy-QRST 5. memory-implicit+absorb info. 6. best approach-description 7. research-results	visual verbal research encoded implicit	results (cell matter) stored absorb

Lecture 3

Name	Listening	Topics and subtopics N=14	Key information about topics and subtopics N=32	Additional information N=20	Totals N=66
Arina	1	8 (57.1%)	9 (27.9%)	1 (5%)	18 (27.3%)
	2	10 (71.4%)	6 (18.6%)	5 (25%)	21 (31.8%)

Increase/Decrease Table Lecture 3

Name	Topics and subtopics	Key information	Additional information	Totals
Arina	+14.3%	-9.3%	+20%	+4.5%

Lecture 3

Name	Listening	Match	Spelling	Vocabulary and phrase building
Arina	1	1. sleep-description 2. sleep-function 3. sleep-reason 4. perspectives-names 5. sleep-cycles and stages 6. dreaming-description 7. dreaming-physiology	diffret biologycal secadian prossess peresrective hibonation cicle psycology	(rem sleep) repetitive (cerebral restoration) (brainwave patterns can be identified) (brains emit waves) (circadian rhythm)
Arina	2	1. sleep-biological need 2. circadian rhythm-function 3. sleep-perspctiveist-names 4. sleep- cycles and stages 5. rem sleep-description 6. dreams-definition 7. dreams-physiology 8. dreams-content		

Lecture 4

Name	Listening	Topics	Key information	Additional information	Total score
Arina	1	8 (50%)	11 (37.9%)	2 (13.3%)	21 (35%)
	2	14 (87.5%)	10 (34.5%)	7 (46.6%)	31 (51.6%)

Increase/Decrease Table Lecture 4

Name	Topics	Key information	Additional information	Total score
Arina	+27.5%	-3.4%	+33.3%	+16.6%

Lecture 4

Name	Listening	Match	Spelling	Vocabulary building
Arina	1	1. foibles-types 2. therapies-types 3. systematic desensitisation-phases 4. modelling-description 5. drug therapies-results	anxity acrofobia clostrofobia physiacl fobies psycodinemic free asosiation systemet de relaxatio respons drog anxieusly typ	
Arina	2	1. anxiety-definitions 2. disorders-types 3. symptoms-examples 4. phobic fear-examples 5. compulsions-definition 6. therapies-types 7 .phases-description 8. modelling-description 9. drugs-drawbacks	anxiety acrophobia claustrophobia physical phobia psychodynamic desensitization	(dream analysis) (generalized anxiety) (substantial contribution) psychotropic

Lecture 5

Name	Listening	Topics and subtopics	Key information about topics and subtopics	Additional information	Totals
Arina	1	9 (75%)	4 (15.4%)	1 (20%)	14 (32.5%)
	2	6 (50%)	6 (23%)	2 (40%)	14 (32.5%)

Increase/Decrease Table

Name	Topics	Key information	Additional information	Total score
Arina	-25%	+7.6%	+20%	0%

Arina Lecture 5

Name	Listening	Match	Spelling	Vocabulary and phrase building
Arina	1	1. anxiety disorder-fact 2. phobia-types 3. simple phobias-description 4. mood disorder-description 5. major depress-definition -definition	symptems agrophobia majar depress abnormity stops of phrimia	
	2	1. mental illness-fact 2. mental illness-analogy 3. phobia-definition 4. phobia-example 5. mood disorder-explanation 6. schizophrenia-definition	abnormality schizophrenia	(mental illness) (has lost contact with reality) (unreal dream)