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**Employing Speech-Recognition Technologies to  
Address the Problems of Phonetic Practice in the  
EFL Classroom.**

**M.Sc. (Technology & Learning)**

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## **Declaration**

I declare that the work described in this dissertation is, except where otherwise stated, entirely my own work and has not been submitted as an exercise for a degree at this or any other university.

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15<sup>th</sup> May 2008

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Thank you to my Parents and family for their continued support throughout my lifelong learning experience.

And in memory of those departed: Zebby, the DOC, and most recently Mac.

As technology advances, it reverses the characteristics of every situation again and again. The age of automation is going to be the age of 'do it yourself.'

Marshall McLuhan (1967)

## ABSTRACT

Phonetics is the science of articulation and reception of human speech sounds (Fennell, 2001). It is generally accepted that phonetics are important for the acquisition of a second language (L2), however, there is evidence to suggest that there is a lack of action on this knowledge by teachers and students. Advances in automated-speech-recognition (ASR) technologies and developments of more human-like virtual agents have made it possible to provide a multimodal environment to practice and self-assess phonetic skills without the need for a human assessor (Massaro, 2004, 1999). These technologies have been successfully employed in the field of speech therapy but, when applied to EFL tuition may provide the basis for addressing the gap in phonetic practice by providing teachers and students with a resource to supplement classroom tuition, replacing the need for 'choral drilling'<sup>1</sup>. Accordingly, this paper sets out to investigate how ASR technologies can be adapted to facilitate phonetic practice for L2 learners as a supplement to classroom tuition.

An interactive multi-media tool, PHONLAB, was designed as a desktop application to facilitate learners to practice phonetics mediated through an avatar, BALDI, which incorporates ASR capabilities allowing for self-assessment drill practice and corrective responses to user utterances mediated through the avatar. The tool incorporates tested learning interactions; listen-record-playback, user controlled demonstration, rollover buttons, click-on object, drag-and-drop tests, text input and remote storage, and introduces ASR mediated oral interactions. The content is based on lessons familiar to Pre-intermediate and Intermediate students from EFL course-ware, providing a supplemental resource for teachers when practicing a problematic area. The tool was tested in a private EFL school over a period of one week. A limited study was undertaken to assess whether using the tool might encourage students to engage with a phonetics approach and whether teacher's attitudes to teaching phonetics might change. The findings indicate that student's technical abilities are such that little in the way of instruction was necessary in the use of PHONLAB, affording the possibility of self-regulation practices. Teacher and academic management observational testimony indicates a high level of engagement with the core subject, phonetics, as mediated through the tool and a willingness to employ PHONLAB as a phonetic teaching resource. Evidence also suggests that participants believed that improvements occurred in their ability to recognise and reproduce the phonetic sounds covered by the lesson.

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<sup>1</sup> 'Choral drilling' is a common practice for classroom tuition of phonetics, which is identified as having limitations.

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### **Abbreviations Key:**

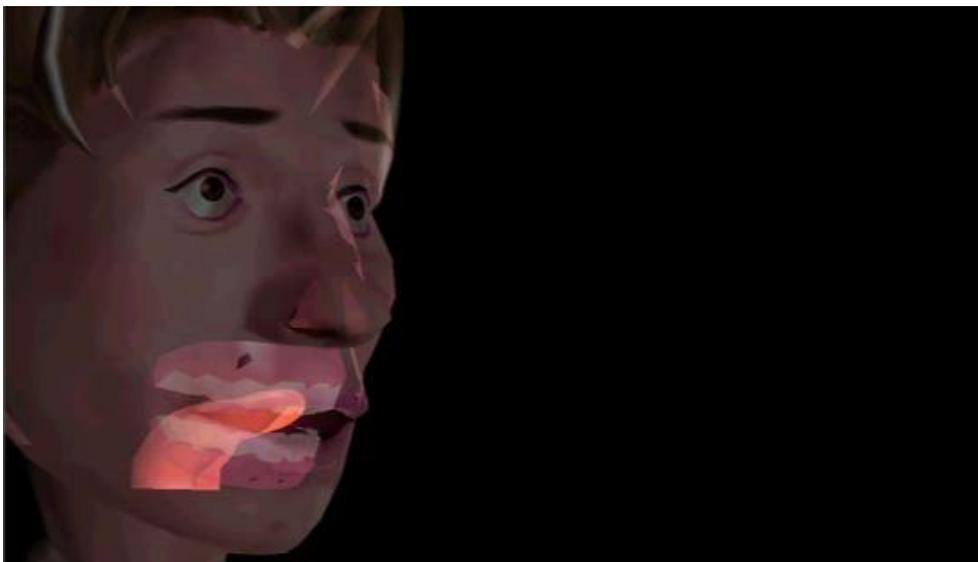
ASR	- Automated Speech Recognition
CA	- Communicative Approach
CSLU	- Centre for Speech Language Understanding
CMC	- Computer Mediated Communication
DST	- Dynamic Systems Theory
DS	- Dynamic System
EFL	- English as a Foreign Language
ELT	- English Language Teaching
ESL	- English as a Second Language
IH	- Interaction Hypothesis
IPA	- International Phonetic Alphabet
IP	- Information Processing
L1	- First language
L2	- Second language
NS	- Native Speaker
PA	- Phonological Awareness
PC	- Phonetic Chart
PM	- Phonological Memory
RAD	- Rapid Application Developer Toolkit
RELSA	- Regulatory board for EFL teaching accreditation
SCT	- Socio-cultural Theory
SLA	- Second Language Acquisition
SRT	- Speech Recognition Technology
TEFL	- Teaching English as a Foreign Language
UG	- Universal Grammar
VoiceXML	- Voice Extensible Mark-up Language
W3C	- Web 3 Consortium

## 1. Introduction.

### 1.1. Background and Context.

Face-to-face oral communication is a complex interaction of many cognitive and behavioural faculties including; recognition, processing, reproduction, and is a *multisensory* audio-visual experience mediated through the *socio-cultural* environment within which it takes place (Massaro, 2004). Vygotsky observed how children acquire language by interacting socially with their mothers when learning a first language (L1) and viewed language acquisition as a socially mediated process. In our first years of development in a language, before the reading stage, we learn, understand and can reproduce an enormous amount of new vocabulary. This ability to learn and reproduce new verbal material has been linked to *phonological memory* (PM) skills. In a study by O'Brien (2007) it was indicated that PM skills were a predictor of oral fluency in adult second language (L2) learners.

In this dissertation we expand on O'Brien's (2007) study by exploring the possibility that L2 PM skills can be stimulated by oral practice as mediated through an interactive multi-media learning tool, PHONLAB. The tool incorporates ASR technologies allowing for; self-assessment drill practice and corrective responses to user utterances, and an avatar which is user manipulable to control transparency, affording a detailed demonstration of the phonetic mechanisms required for correct pronunciation, referred to as a 'viseme' (*Figure 1*).



*Figure 1: BALDI avatar showing 'viseme' or detailed animation of articulation mechanism.*

PHONLAB is a self-regulated environment for demonstration and self-assess drill practice, reinforcing classroom tuition in an area of the EFL curriculum which has previously proved problematic. The tool incorporates tested learning interactions; listen-record-playback, user controlled demonstration, rollover buttons, click-on object, drag-and-drop tests, text input and remote storage, and introduces ASR mediated oral interactions.

In a survey conducted for this study, a problem has been identified with attitudes towards current EFL classroom practice of phonetics (Appendix 2/3). 13 teachers and 75 students completed a questionnaire on how important they considered phonetics to learning new vocabulary, the results indicated that 54% of teachers believed phonetics are as important as grammar to learning language, but, in the same survey the results indicate that only 23% of teachers currently use phonetics to teach new vocabulary in the classroom, 30% indicated that they would teach phonetics but were unsure of all the sounds. The same survey indicated that 56% of students also consider phonetics and the sounds of language to be important for language learning, however, when asked if they would use phonetics to help them learn how to say new vocabulary the percentage fell to 16% indicating a lack of action on the knowledge that phonetics are important. It could be argued that these findings are indicative of a lack of action on the knowledge of the importance of phonetics to SLA. It can also be argued that a lack of phonetic awareness limits the learner's ability to recognise and reproduce new verbal material within interactive communicative opportunities with L1 users.

## **1.2. Research questions.**

This dissertation addresses the question as to what extent ASR technologies can be used to facilitate a phonetic approach to EFL tuition.

To address the problem of learner and teacher engagement with, and attitudes towards phonetic practice, PHONLAB was designed as a desktop phonetic demonstration and drill practice application. The objective is to provide EFL students with a self-regulated learning environment for demonstration, self-assessment drill practice and computer mediated assessment of user utterances as

a supplement to classroom tuition. A secondary aim is to provide teachers with a resource to help address the problematic area of phonetic choral drill practice. A number of sub-questions arose regarding the efficacy of using such a tool;

- Can PHONLAB help to improve student engagement with learning and practicing phonetics?
- Does using PHONLAB help to promote self-regulated learning strategies for practicing phonetics?
- Can using PHONLAB change user attitudes to learning phonetics?
- Do teachers see a value in using PHONLAB as a supplemental communicative activity for phonetic practice?

### **1.2.1 Blending technologies for richer learning experiences.**

PHONLAB was built using Flash 8 and incorporates a 3-D Virtual Agent or avatar, BALDI, designed using a rapid application developer (RAD) toolkit developed at the Centre for Spoken Language Understanding (CSLU), University of Colorado. Both of the technologies employed offer rich learning environments with individual characteristics.

Flash was used as the main interface to present the core subject, phonetics, utilising 'rollover button' and 'drag-and-drop' interactions, however, Flash is limited in speech recognition capabilities. The RAD toolkit is dedicated speech recognition software with limited presentation capabilities, but has many advantages over human demonstration the most important for the purpose of this study are; the ability to provide the user with a viseme (*Figure. 1*) view and, to assess user utterances providing instant feedback on accuracy to the user. By blending these technologies it is possible to provide the student with a rich environment for learning and practicing phonetics.

Scherer (1965), when discussing the use and misuse of language labs, suggested that their success depended “...not on its existence alone, but rather upon how well it can be made to supplement the work of the classroom.”. Many applications (*Figures. 2/3/4/5*) are available which use a Flash interface for demonstration of phonetics, however, in an extensive search by the

researcher/developer none were discovered that directly related to EFL course-ware. Having identified this gap in availability of specifically designed content it was decided to provide content that was designed to address the particular needs of EFL learners, and teachers, based on lessons familiar to the students through the course-ware used within the case study school. The graphics were designed to be easily adaptable for use in both the Flash and BALDI interfaces. The grammar content was pre-taught in the classroom.

### **1.3 The present study.**

A limited study was conducted involving 75 students (including a focus group of 6), 13 teachers and 3 members of the academic management at a private EFL school in Dublin. The teachers and the students from the focus group were first instructed in the use of PHONLAB over a one hour session. The focus group of 6 students were further tested over 2 one hour sessions, the students were instructed on particular common phonetic rules within EFL and based on grammar which was pre-taught, these sessions were video-recorded to assess teacher/researcher interventions or technology glitches. On completion of the contact sessions students completed a questionnaire to assess how the experience had affected their motivation and attitude to learning the phonetic symbols. During the study the teachers took observation notes paying particular attention to student engagement, technical problems that were considered to be disruptive<sup>2</sup> and any other relevant observations. Teachers also completed a questionnaire assessing PHONLAB as a supplemental teaching aid for practicing phonetics. The Academic management completed a questionnaire to evaluate PHONLAB as a resource to extend the curriculum of the school.

### **1.4 Thesis Roadmap.**

The Literature Review discusses the various theories within the field of language acquisition and identifies the technologies that can mediate phonetic practice.

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2 A recurrent problem was identified when moving between the Flash and BALDI interfaces. This problem was resolved by rebooting the system, the whole process taking less than two minutes to return the user to the page that they were working on. In agreement with the teachers, this length of time was considered not to be disruptive.

The following chapter describes the implications for the design of the tool, the technologies used to build it and how the learner experience is mediated by its use.

The next chapter describes the research methodology employed and how the findings were reached.

In the next chapter the results of the research are presented and analysed in relation to the research questions.

In the final chapter the findings are discussed in terms of their relevance to language acquisition pedagogy. We also point out limitations with the present study and areas for further research.

## 2. Literature Review.

### 2.1 Introduction.

*“Whereas the information processing paradigm sees creativity as a property of the language system itself, . . . dynamic systems theory views creativity as a property of agents [sic] behavior in co-regulated interactions”*

Shankar, King; 2002  
in de Bot, et al, 2007; p. 10

This chapter sets out to explore the theories underpinning current thinking in SLA. The focus is on the phonological acquisition of English as a foreign/second language (EFL/ESL). Our phonetics approach is based on the symbols employed by the IPA as represented by the PC (Appendix 1) common to most EFL courseware. We will conclude with a description of the technologies that make this approach possible.

### 2.2 Interactive communicative approaches to language acquisition theory.

ELT practice in Ireland is influenced by an *'interactionist' communicative approach* (CA) with the students *immersed* in the language and culture. The goal of this approach is to provide the student with relevant vocabulary and grammatical structures with which they can meaningfully communicate with NS outside of the classroom. Immersion in the culture provides the environment to engage with meaningful interaction creating an opportunity for *incidental* or *informal* learning (Krashen & Terrell, 1983; Ellis, 1999; O'Brien, 2007; 2006;). The CA is typified by Long's (1996) *Interaction Hypothesis* (IH), *'negotiation of meaning'* through meaningful interaction as a result of communication breakdown affords the learner to *'reformulate'* their output, *meaning* is a code hidden within the vocabulary and grammatic structure, once the code is broken acquisition can take place. This approach follows a linear *information processing* (IP) model which assumes that all students acquire language in similar stages with a clear beginning and end state (de Bot, et al, 2007).

The IH is contrasted by *socio-cultural theory* (SCT), stemming from Vygotsky's observations of how language acquisition is socially mediated and is regulated by the learner as a result of their *locally determined goals*, socio-cultural background, motivations and circumstances. Acquisition is a "*ripening process along a path... dependent on the [sic] interactional experiences of the individual.*" (Ellis, 1999; pg.20). In this view SLA is part of a complex dynamic interaction between many interconnected variables and follows a non-linear and sometimes unpredictable course (de Bot, *et al*, 2007).

De Bot, *et al* (2007), suggest using a Dynamic System Theory (DST) approach to Second Language Acquisition (SLA), as opposed to an IP/Universal Grammar (UG) approach. DS's require interaction to operate and require the learner to actively engage with their learning as a process of development. "*The learner has his/her own cognitive ecosystem consisting of intentionality, cognition, intelligence, motivation, aptitude, L1, L2 and so on.*" (De Bot, *et al*, 2007, pg. 14), an internal sub-system which operates within the wider external '*social ecosystem*', development following an individual path. (De Bot, *et al*, 2007; Van Geert, 2007).

The SCT and DST approaches encourage active learning with an emphasis on the learner as the catalyst for their own learning experience and suggest a shift to learner focused materials or facilitation of self-regulation practices.

### **2.3 Phonetics.**

Phonetics is the science of articulation and recognition of human speech sounds. The articulation mechanism involves an intricate co-ordination of breath control and movement between lips, tongue and larynx. Normally developed humans are born with the same articulatory mechanisms and have the potential to make the same range of speech sounds (Fennel, 2001; Massaro, 2004; *et al*, 1999). The phonetics used within any language are recorded by the language's PC, each sound being represented by an internationally recognised phonetic symbol or phoneme. Phonemes represent the smallest identifiable and articulable sounds known to be possible within human speech and are the scaffold on which the phonological structure of oral language is constructed (Fennell, 2001).

### **2.1.1. Phonological Memory.**

PM skills have been shown to have a link to children's natural ability to acquire new L1 vocabulary through verbal interaction (Gathercole & Baddeley, 1990; Gupta, 2002). O'Brien (2007) suggests that phonological memory (PM), a component of the *phonological loop*, is connected to word and phrase recognition processing within oral interaction in adult SLA. The *phonological loop* is associated with short-term working memory and "...contains a phonological store, which holds verbal information for short periods of time, and an articulatory rehearsal process, which refreshes the contents of the phonological store." (O'Brien, 2007; pg. 559). Gathercole & Baddeley (1990) point to strong evidence to suggest that "...short-term phonological memory skills are linked to long-term learning of new verbal material..." (pg. 440), referring to the case study of PV<sup>i</sup> an adult patient with a deficit in the phonological loop (see also: Baddeley, Papagno, & Vallar, 1988; Vallar & Baddeley, 1984; in O'Brien, 2007). PM is a variable temporary state which has different needs as the learner develops within the phonological structure of the language. As each language has its own phonological structure, it follows that when learning a L2 the learner needs to learn not only the grammar and vocabulary but also the rules of the L2 phonological structure.

The learning of speech and recognition of speech sounds requires that the learner actively participates in the process of their learning, no-one else can articulate, or hear, for them (Levelt, 1989). In a study by Mackey (2000) it was observed that students who actively participated in an interaction showed more advanced utterances than less active participants (Morton & Jack, 2004), Ellis & Sinclair (1996, in O'Brien, 2007) "...found that the maintenance of L2 utterances in memory through repetition resulted in better vocabulary acquisition and more overall grammatically correct speech attempts in the L2 than when repetition was suppressed." (pg. 560), this points to the benefits of oral practice for language acquisition.

### **2.3.2 The problem with phonetic practice.**

Phonetics is typically not taught to first language learners, subsequently,

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i PV is the identifying name for the adult patient on which the study referred to is based.

most L1 learners/users would be unfamiliar with the relation of the phonetic symbols to the sounds they represent. Most Teaching English as a Foreign Language (TEFL) courses are short-term intensive programmes (120 hours) designed to provide teachers with a broad knowledge of the grammar, syntax and lexis of English with an emphasis on a CA. Phonetics are not considered core to the TEFL curriculum and only a short time is devoted to introducing the prospective teacher to the PC and the phonetic symbols. Phonetics is not covered as part of the RELSA exam which is used for accreditation of TEFL teachers in Ireland. Unless a teacher has an interest in linguistic sciences there is no incentive to further learn the PC. In the teacher survey 30% of respondents indicated that they would teach phonetics but were unsure of the sounds, whilst a further 30% would only teach phonetics if students asked them to.

Many EFL students are unsure of the sounds represented by the phonetic symbols, they are viewed as another language, learners fail to see their connection to L2 vocabulary acquisition and lack motivation to practice or learn the sounds. It could be argued that not being able to identify the sounds, or how to reproduce them, limits the learner's ability to recognise and reproduce new verbal material within interactive communicative opportunities with L1 users. Another problem arises when the learner is removed from the classroom, the *static* PC, with its *text key words* (Appendix 1), is unable to demonstrate the correct sound or test its practice. The *text key words* can be misleading as the written visual stimuli, the letters/graphemes that make up words, often represent different phonetic sounds in the students L1 (Fennell, 2001). When removed from the watchful ear of the assessor the student can revert to their own L1 visual stimuli association which leads to mispronunciation of the word/sound (Van Geert, 2007) inhibiting the students ability to recognise individual words when spoken in conversation with NS, thus, it can be argued, limiting their communicative learning experience. An example of this is the pronunciation of the letter 'i' (pronounced /ai/), in Italian and Spanish the letter 'i' is pronounced the same as the English language letter 'e' (pronounced /i:/) resulting in a common error when differentiating between 'minimal pair'<sup>3</sup> words such as 'ship' and 'sheep' (Baker, 2007).

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3 'Minimal pairs' are words with similar spelling that have a single phonetic difference. an area which has been identified as causing confusion for L2 learners (Baker, 2007).

### **2.3.3 Choral drill exercises and the language lab.**

The learning of the phonology of a language requires two predominant skills; listening and reproduction. "*Carroll (1977) suggests that learning from aurally received input is enhanced by repetition of the material heard (repetition on the part of both the speaker and the listener).*" (in Dunkel, 1991, pg. 440). In the EFL classroom phonetics are generally practiced as a choral drill exercise. Some pitfalls exist with this approach as outlined by Matthieu (1964) when he describes how choral drill in the classroom favours the student that is faster at responding to the stimulus. Scherer (1965) describes the teacher as needing to be "*...an extremely alert detective during class repetition...*" (pg. 243) in order to spot individual difficulties, and how the exercise itself can serve to mask individual problems due to the 'noise' generated.

The use of a language lab (if one is available) can address some of the problems with production-oriented instruction (Dunkel, 1991) providing an environment where "*...students can be listening and responding individually rather than in unison in choral drilling,*" (pg. 437). However, the traditional language lab has also been fraught with problems for the teacher and individual student (Johnson, 1966). Within a lab session that is controlled from a central console, the student has little personal control of the pace of delivery and no opportunity to pause and repeat areas which might prove difficult for them, and if the teacher is monitoring from the central console they can only listen to one student at a time. Whilst acknowledging the problems of the language lab Scherer (1965) suggests that it may have value if employed to supplement the work of the classroom providing the student with '*overtaching and reinforcing*' of previous classroom tuition.

### **2.4 Technology assisted language learning.**

Technology has been used as a mediator for oral language practice since before the mass computer age. In the 1960's a debate raged about the use of tape recorder language labs and the limitations of using such a facility (Mathieu, 1961; 1964; Scherer, 1965). In the 1970's the emphasis shifted to audio-visual materials available through television, film and, subsequently, videotape (Moore, 1970). With

the explosion of the mass computer age during the 1990's the paradigm has shifted from output only demonstration to interactive user responsive applications. At the beginning of the 21st century, the rapid growth of processing speeds and the rollout of broadband technologies have created the environment for the development of Web 2.0 social networking applications, with implications for design of collaborative learning experiences; Chat-rooms, Web Quests, Second Life (Fleta, et al, 1999). Virtual environments are providing a new paradigm for the *human-computer* interface and how we interact with certain forms of content (Morton & Jack, 2005; Massaro, et al, 1999).

Availability of language learning content ranges from freeware<sup>4</sup>, available for download online, to complex commercial desktop software for a complete L2 learning course<sup>5</sup>. Computer mediated communication (CMC) has been shown to be beneficial to language learning by providing a rich multimodal interactive environment which facilitates a self-regulated learning experience (Chang, 2005; Abrams, 2003; Jarvis, 2006; Shamsudin & Nesi, 2006; Wagener, 2005). The possibilities for CMC are being further enhanced by advances in the field of *speech recognition* and *audio processing* (Privat, et al.,2002).

#### **2.4.1 Technology employed for phonetic demonstration.**

The importance of phonetic learning has been embraced by developers of on-line and down-loadable language learning content and is evidenced by the range of tools currently available. Technology has many advantages over the static presentation of the PC, which is unable to demonstrate the phonetic sound, the articulation mechanisms or test users utterances. Learners can choose from simple demonstration of the symbols with embedded sound (*Figure. 2*), or detailed 'viseme' views (*Figure. 4*), or can self-assess utterances using the listen-record-playback model common to the language lab (*Figure. 5*).

A considerable amount of the available content has been designed in Flash taking advantage of Flash's ability to embed the phonetic symbol and sound within a button;

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4 Eg: Sephonics a free-download available at: <http://www.wartoft.nu/software/sephonics/>

5 Eg: RosetaStone a commercial language course available on CD-Rom. A demonstration is available on-line: <http://www.rosettastone.com/>

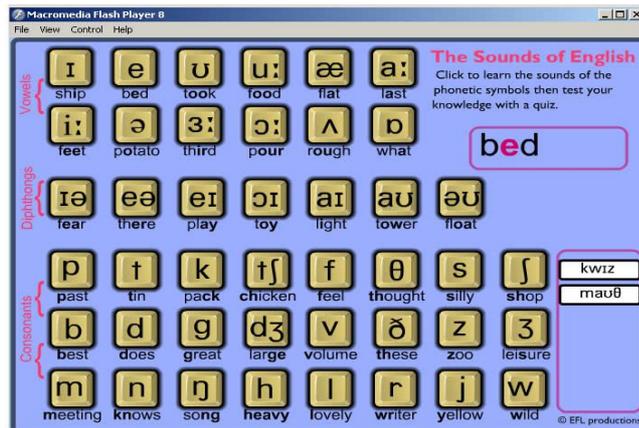


Figure 2: EFL productions PC with symbol and sound embedded in a 'click-on' button.

The EFL productions PC (Figure. 2) presents the symbols divided into their classes and includes a recording of a keyword representative of the sound. Users can take a quiz, converting phonetic script back into normal text, or see a chart which represents the phonetic articulation positions;

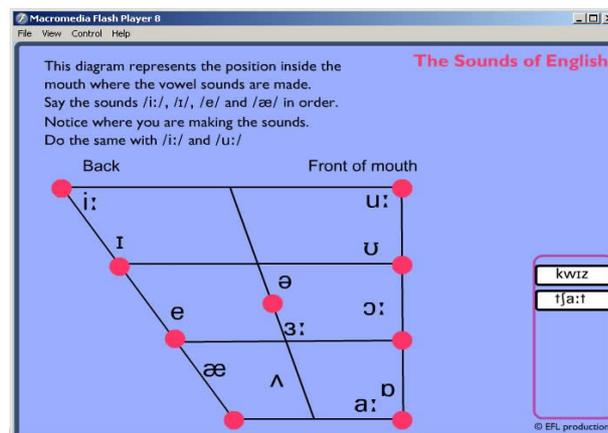


Figure 3: EFL productions PC showing phonetic articulation positions as a graphic.

The articulation chart (Figure. 3) requires that the user has some knowledge of what the chart represents. Such a detailed analysis is beyond the brief of most EFL teachers and learners unless they have a particular interest in the field of phonetics. The University of Iowa's site 'Phonetics: The sounds of American English. (Figure. 4) has incorporated a 'viseme', a detailed animation of the articulation mechanism, offering users a less technical visualisation of the articulation mechanism;



Figure 4: The University of Iowa's site 'Phonetics: The sounds of American English.' with viseme.

The viseme is reinforced with a video of human lip movement. The introduction of a viseme view serves to highlight the difficulty of human only demonstration of the articulation position, unless a student has x-ray vision it is impossible to see the intricate movement of tongue, larynx and teeth position necessary for correct articulation.

Neither the EFL productions PC or the University of Iowa's site offer the user any opportunity to test their own articulation. The Cambridge English Online site (Figure. 5) addresses this problem by linking to Microsoft's internal sound recorder which is accessed locally through a downloaded Flash movie. Users can record, save and playback their utterances following the listen-record-playback model associated with language lab practice. However, users have no expert evaluation of the utterances unless they record and save for external assessment. All of these applications are available for free either on-line or for download.

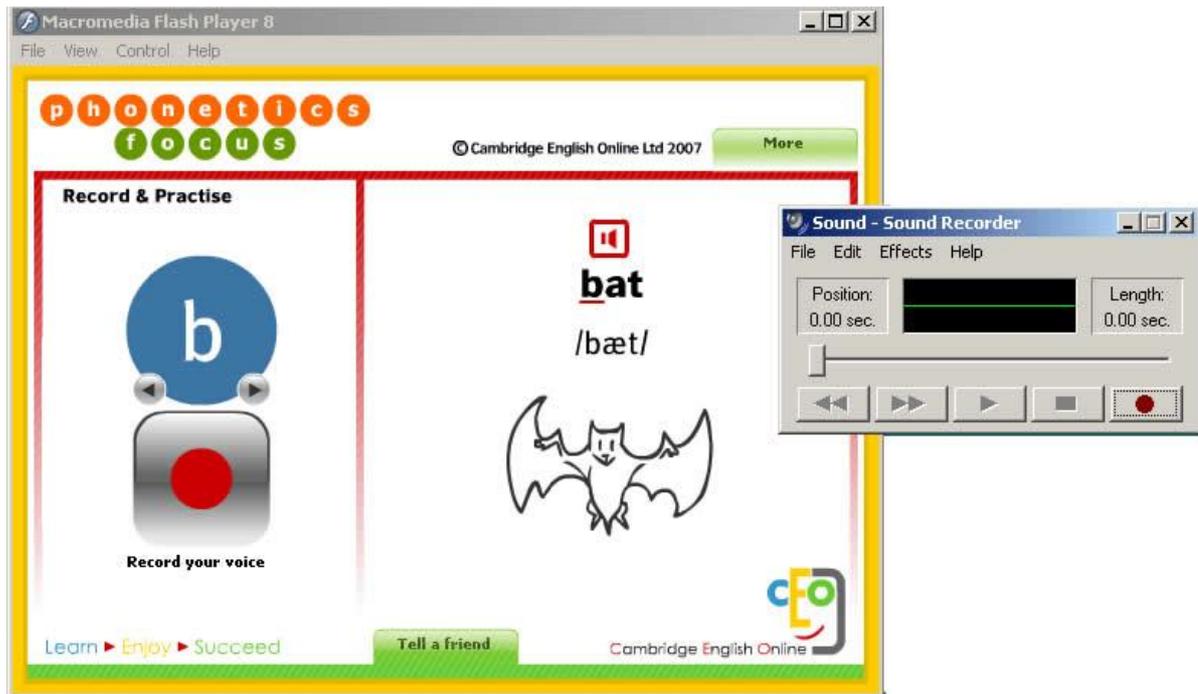


Figure 5: Cambridge English Online downloaded Flash movie with Microsoft's internal sound recorder open.

#### 2.4.2 Adapting speech therapy tools for SLA.

The requirements of oral SLA and speech therapy share many characteristics: recognition, articulation and word formation. Much research has been conducted into uses of multimodal applications for speech therapy. A phonetics approach has been shown to be successful when treating certain conditions (Hustad, 2007; Kim, 2007; O'Kelly, 2002; Massaro, et al, 1999).

The Centre for Spoken Language Understanding (CSLU) at the University of Colorado, Boulder have developed a toolkit which enables developers to design interactive oral practice applications mediated through an avatar, BALDI (Cole, 1999; et al 1999b; Massaro, et al, 1999; 2004; McTear, 1999). BALDI was primarily designed for children with impaired hearing to help with articulation. The RAD toolkit incorporates ASR technologies extending the possibilities for development of orally interactive content; elements of the interface are controllable by user utterances. BALDI has many advantages over the listen-record-playback model employed by the traditional language lab, the most important for the purpose of this study are; the ability to measure user utterances for correctness providing users real-time feedback and the ability to become translucent to demonstrate a detailed viseme of the articulation mechanism. These capabilities extend the possibilities afforded to

designers of language learning content. The RAD toolkit is available in the public domain as a platform for research and development of educational course-ware.

## **2.5 Summary.**

In this chapter it has been indicated that PM is an essential element in the acquisition of new vocabulary and is a predictor of oral Fluency in adult SLA. Oral practice can be beneficial to adult L2 learner's ability to reproduce phonological structures. The IPA symbols of the PC have been placed as the initial conditions of the phonological structure of language. A problem has been identified with current EFL classroom choral drill practice.

The theories underpinning current thinking in SLA were explored and two approaches contrasted, the *psycholinguistic perspective* and SCT. Within a SCT approach De Bot, *et al* (2007), propose a DST as an overarching theory which places the learner at the centre of the learning experience.

Technologies have been identified that might be employed to mediate phonetic practice. Individual characteristics of the Flash and BALDI user interfaces were highlighted and placed within the context of current available phonetic practice tools.

In the next chapter we will use the observations from the literature to inform the design of an interactive multimodal self-regulated phonetic practice application, PHONLAB.

### **3. Artefact design.**

#### **3.1 Introduction.**

*“...we need to place more emphasis on the learner and his idiosyncratic capability and less on packaging standard instructional sequences for him.”*

*Mitchell, D. (2006), pg. 94*

It is well known in the literature that oral practice within the L2 can increase learner's ability to further understand new language in communicative interactions. Phonetics approaches, mediated through technology, have been widely and successfully employed within the clinical field of speech therapy. Advances in audio processing technologies and ASR software built on ever increasing processor speeds is providing the possibility to developers of educational content to further integrate interactive speech into language learning applications.

#### **3.2 Interactive technology as a mediator of phonetic practice.**

Technology offers many advantages over the static graphic representation of the PC. As the phonetic symbols are representations of sounds it is difficult to present them graphically, however, by creating the phonetic symbol as a button it is possible to embed the sound with the phonetic representation. Most applications employ a 'click on' or 'rollover' presentation of the phonemes embedded with their sound and offer a recorded keyword example with either a graphic or video-recorded representation of the articulation mechanism or 'viseme' (*Figures. 2/4*). Some applications offer the opportunity to practice and listen back to utterances by using the listen-record-playback model (*Figure. 5*). PHONLAB aims to extend the possibility of phonetic practice by incorporating an interactive avatar, BALDI, with utterance analysis and correction capabilities for real-time feedback, and automated responses controlled by user interactions, both oral and 'click-on' object. The objective is to create a rich multimodal application to practice phonetics in a self-regulated environment as a supplement to previous classroom tuition. A secondary objective is to provide teachers with a resource to supplement classroom teaching and address the problems with choral drilling in an area which has previously been

problematic.

### 3.2 Using PHONLAB.

As a self-regulated learning experience the object was designed with ease of use in mind and to provide users with options to choose from a range of learning content, following a pre-designed lesson as a supplement to previous classroom tuition or creating their own learner strategy. The application is sub-divided into three types of learning content; The Flash interface presents the core subject (the phonemes and PC), the BALDI practice interface allows students to listen-record-playback for self-assessment and the BALDI drill interface analyses and tests the users utterances providing real-time feedback, the avatar mediates the assessment responding with '*good*' or '*try again*' flashcards. The BALDI avatars' visualisation can be controlled allowing the user to decide characteristics such as emotion and opacity, and audio controls such as pitch and pace.

To access the aural content each user was supplied with a microphone headset similar to those used in call centres. Users enter at the 'chart' page of the PHONLAB application (*Figure. 6*). The 'chart' page is made up of three areas: The sidebar buttons are for application navigation and are consistent throughout, these buttons change colour when the page is active. Page navigation is achieved by rolling over the coloured text that describes the content of the page, in the case of the 'chart' page the contents are the phonetic classes; short vowels, long vowels, diphthongs, unvoiced consonants, voiced consonants and other consonants. The phonemes in each of the classes have been colour-coded, in a previous limited study it was shown that students considered colour-coding to be helpful in understanding the phonetic classes (Campbell, 2007). On cursor 'rollover' the class navigation buttons highlight the symbols that are within that class (*Figure. 7*).

The third page element is the presentation area which is divided into two sub areas. The phonetic symbols are 'rollover' buttons which have the phonetic sound embedded, when 'clicked on' a detail box appears with a viseme view (*Figure. 7*) of how the sound is formed, an example keyword for the sound and an input text box for users to record their own keyword.

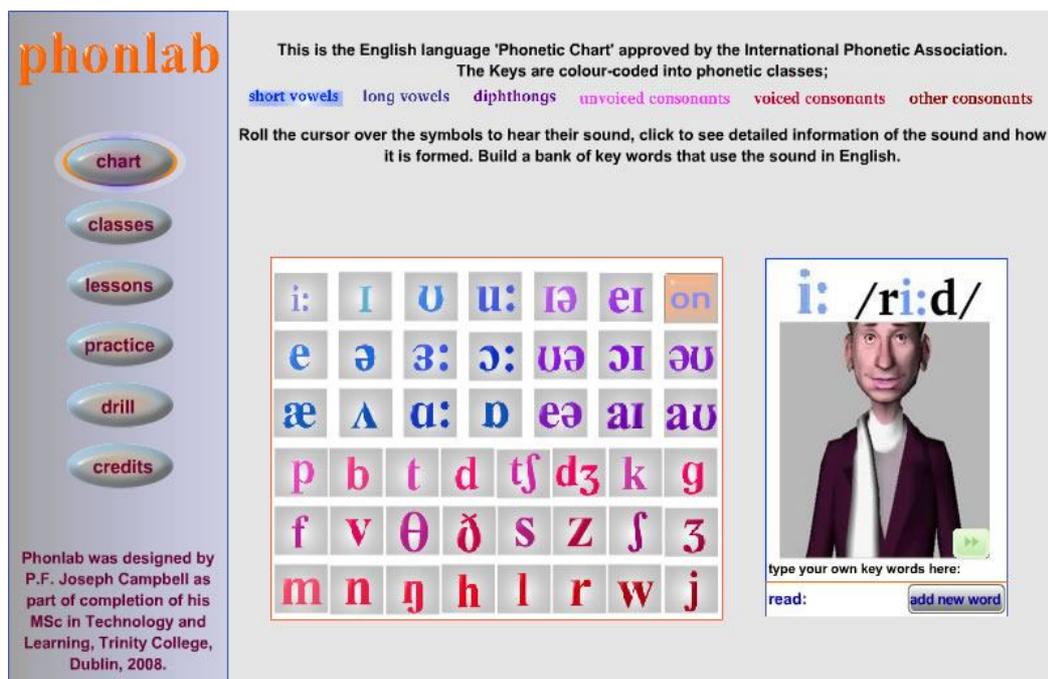


Figure 6: PHONLAB 'chart' page.

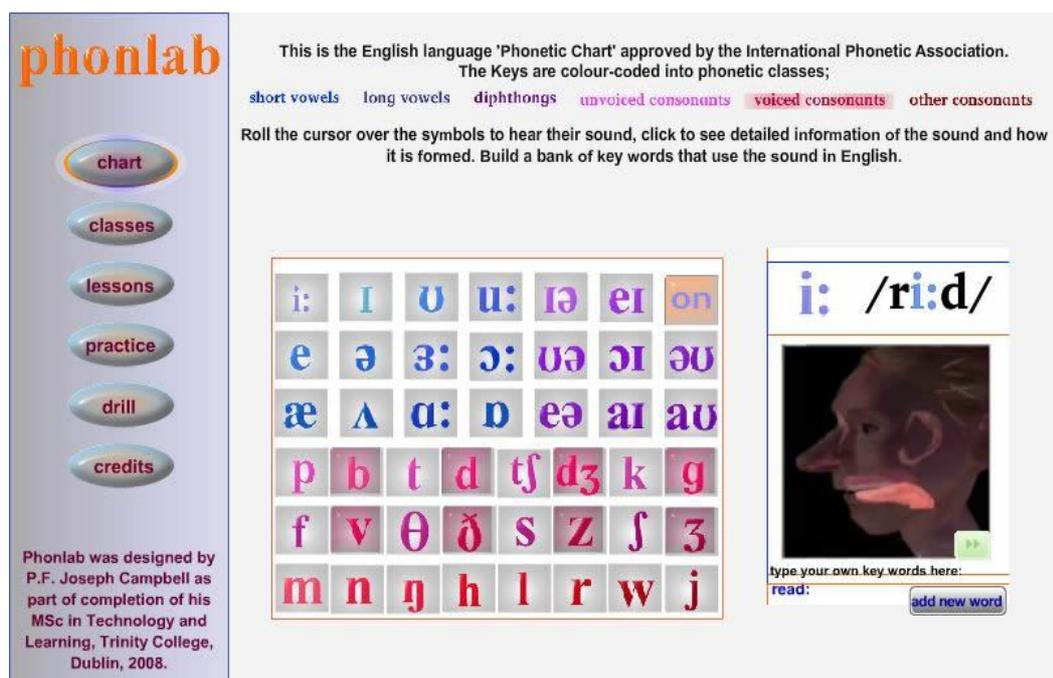


Figure 7: PHONLAB 'chart' page with viseme view open.

The site navigation buttons offer the student options to choose from 'classes' 'lessons', 'practice' or 'drill' and 'credits', which is not part of the learning experience. The 'classes' page provides more detailed information about the phonetic classes. Each of the class pages includes a drag-and-drop test (Figure. 8);

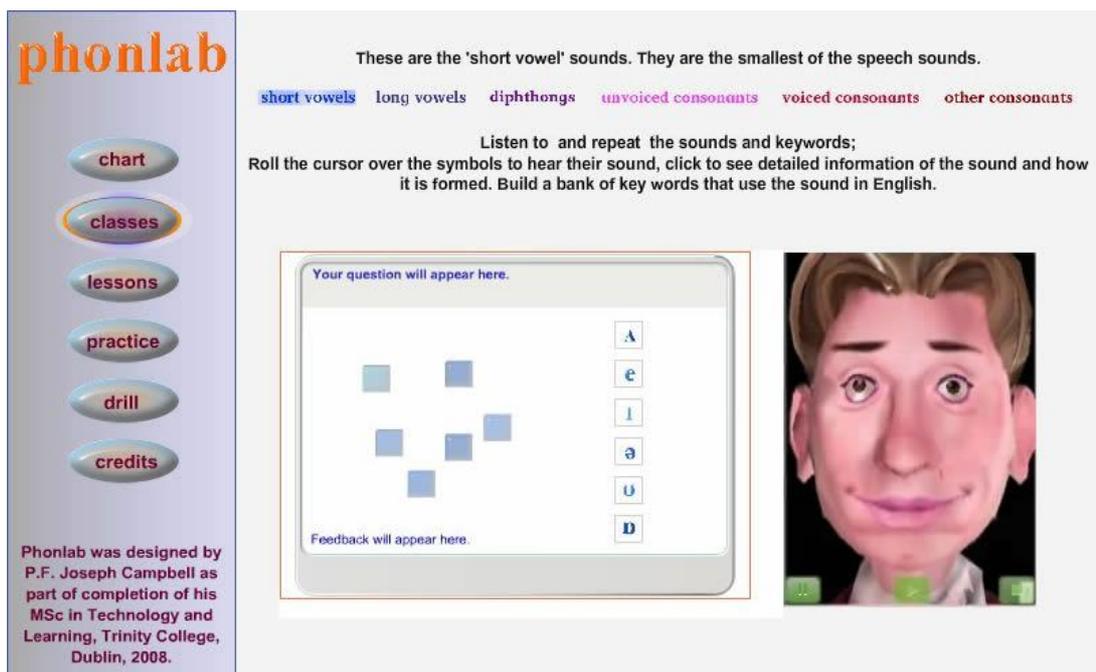


Figure 8: PHONLAB 'classes' page drag-and-drop test.

The 'lessons' page (Figure. 9) provides a structure to the users session. Teachers can use this section as a resource to supplement classroom grammar teaching. The lessons are directly based on content of course-ware familiar to the student and cover the Past Tense /t/ /d/ /ɪd/, Plurals /s/ /z/ /ɪz/ and the Third person /s/ /z/ /ɪz/. Teachers were encouraged to pre-teach one of the areas covered and use PHONLAB as a supplement for the phonetic practice element of the lesson.

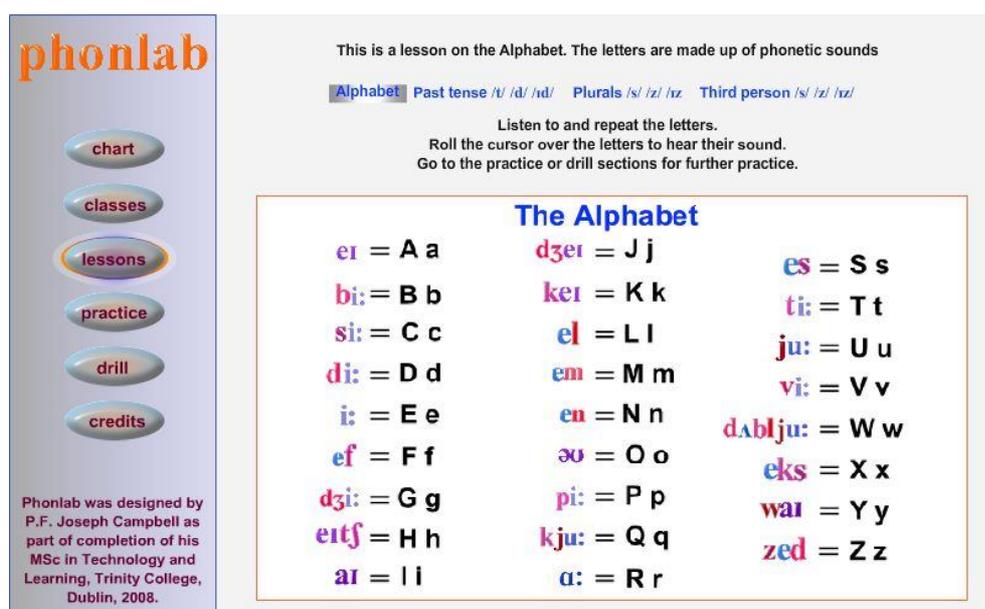


Figure 9: PHONLAB 'lessons' page, The Alphabet.

The 'practice' page is populated by buttons that link to the BALDI practice

application. Each button links to a practice session mediated through the BALDI avatar (*Figure. 10*) and provides the student with the possibility of testing their perception of the symbol representations and a listen-record-playback drill session, finally students are tested on their perception of the symbols through a 'click on' object test, an incorrect response also triggers an automated corrective action by allowing the student to try again twice before continuing.

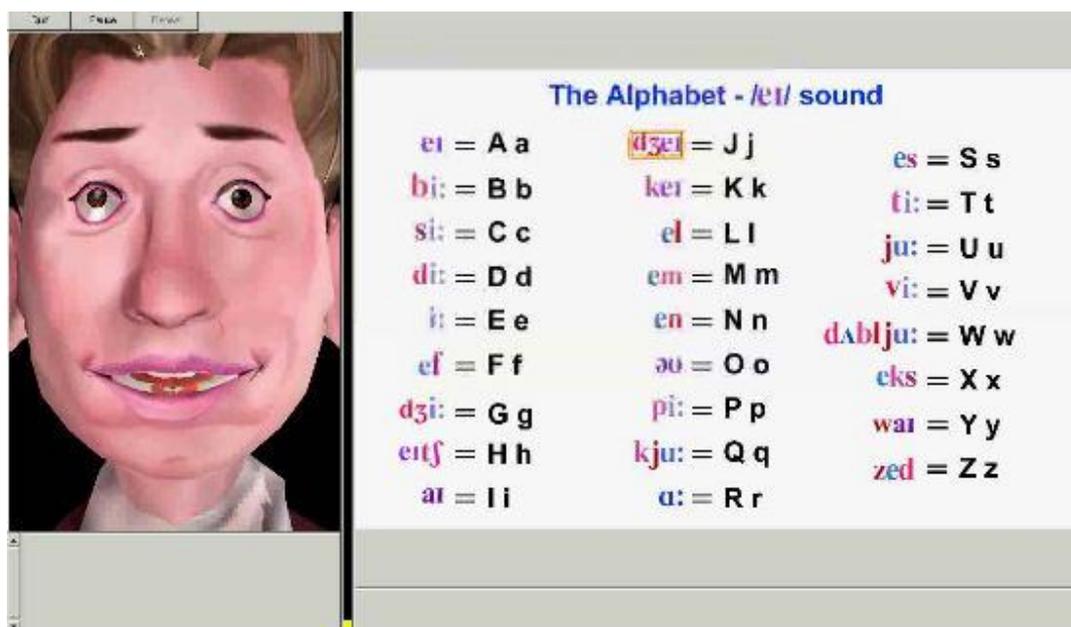


Figure 10: BALDI practice page 1 with 'click on' object presentation.

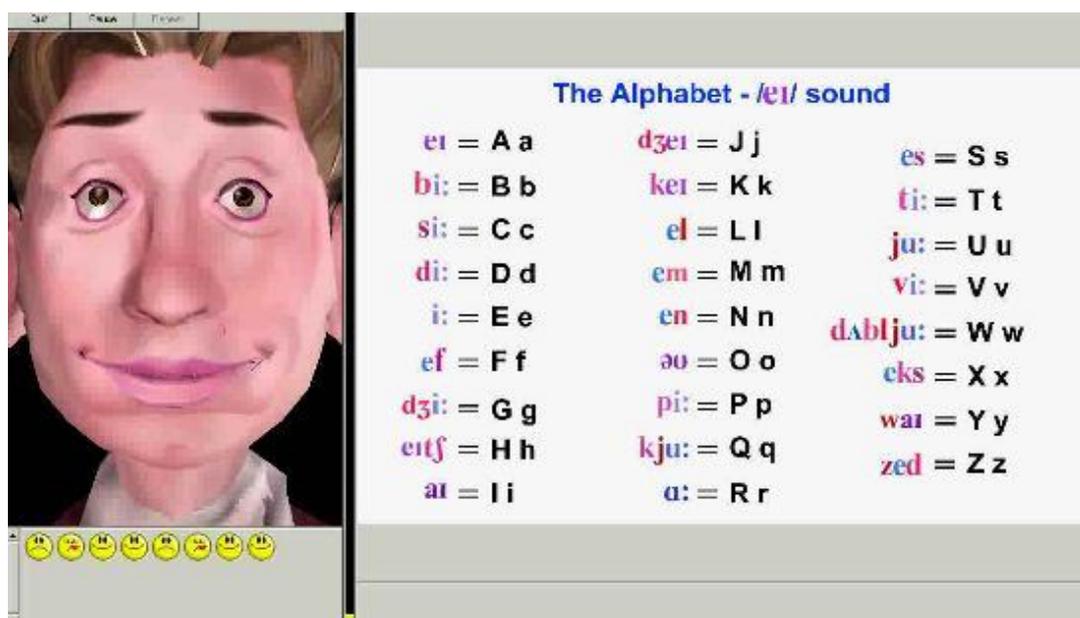
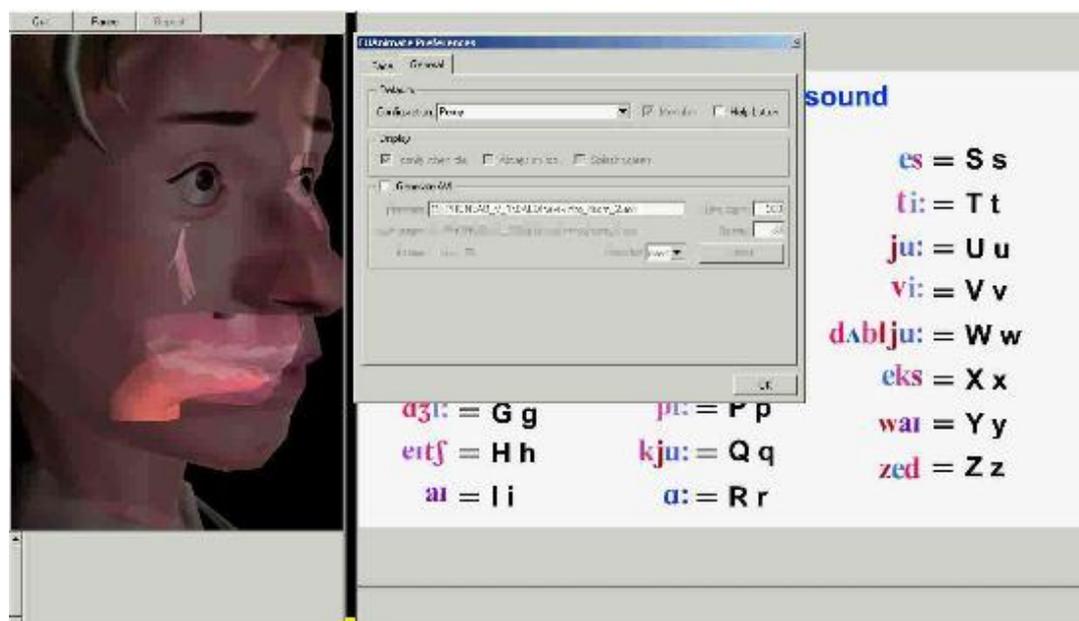


Figure 11: BALDI practice page 2 with 'click on' object perception test and response record.

Another feature to the avatar is the ability to show a viseme demonstration of

the phonetic mechanisms by allowing the user to control opacity (*Figure. 12*). A number of other options are available to the user; change avatar character and characteristics; add emotions to the character; zoom in/out; change position on screen; control pitch and speed of the voice.



*Figure 12: BALDI practice page in viseme view with preferences window open.*

The 'drill' button on the sidebar navigator opens a page similar to the 'practice' page with buttons linked to a different function within the BALDI application (*Figure. 13*). In this section BALDI analyses and tests users on their reproduction skills by providing real-time correct or incorrect automated responses to user utterances. Some command functions within the interface are also controlled by user utterances, promoting listening and reproduction skills.

In *Figure. 13* the letters and phonetic symbols are 'click on' buttons. The user 'clicks on' a button to practice saying it, BALDI analyses the utterance and decides whether it is 'good' or if the user needs to 'try again' (*Figure. 14*). Users can repeat the same letter *ad nauseum* or try a different one, facilitating self-regulation of drill practice with assessment mediated through the avatar.

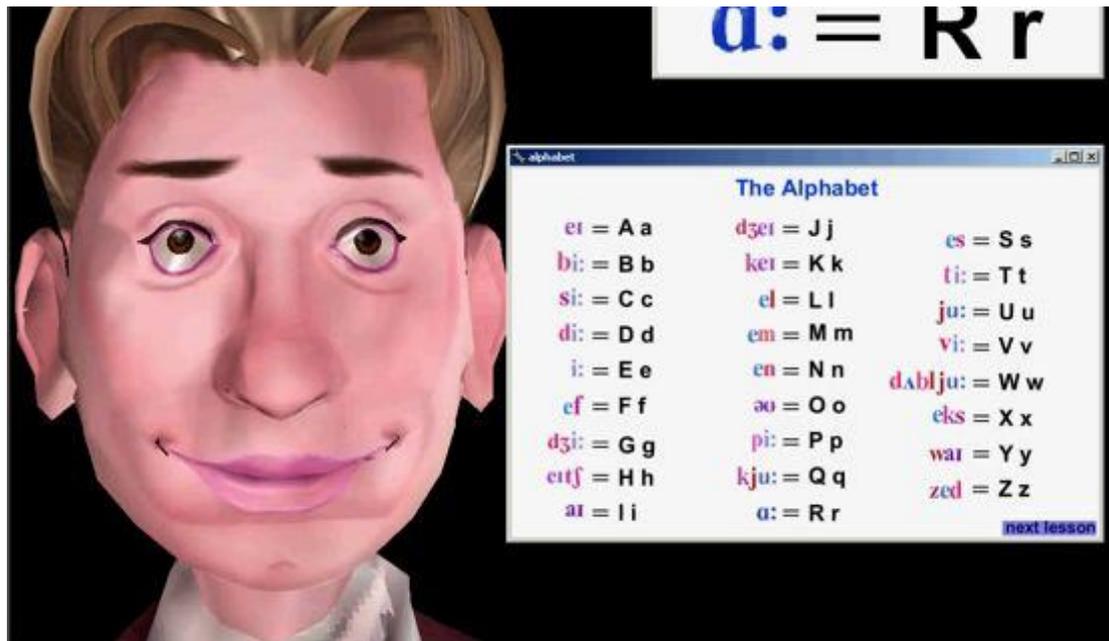


Figure 13: BALDI drill Alphabet main page.

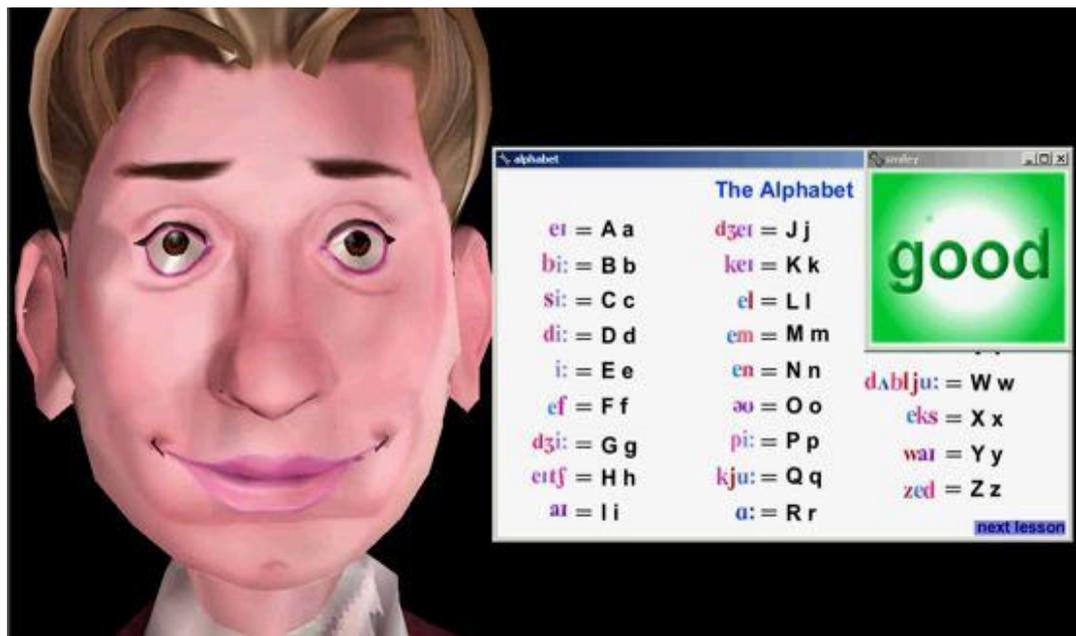


Figure 14: BALDI drill Alphabet main page with utterance correct graphic.

The Spelling section offers users the opportunity to use the letters to complete a spelling task (Figure. 15). The words are 'click on' buttons, when the user 'clicks on' a word they are prompted to spell it and to use the phonetic prompts to help (Figure. 16). As with the Alphabet page, users can practice as many words as they like or repeat words.

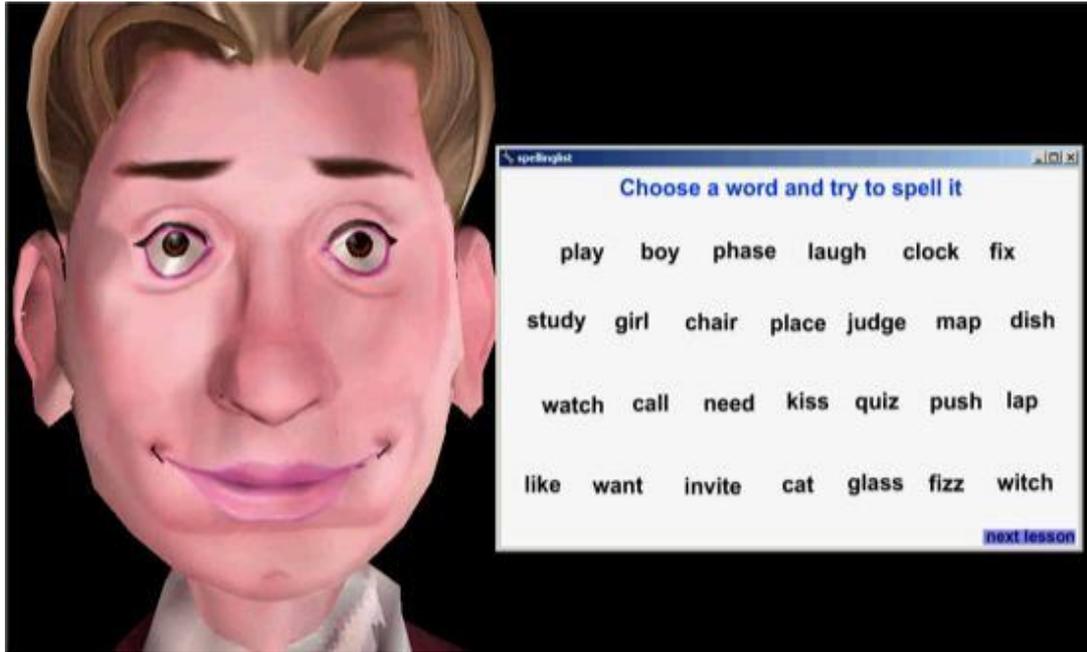


Figure 15: BALDI spelling main page.

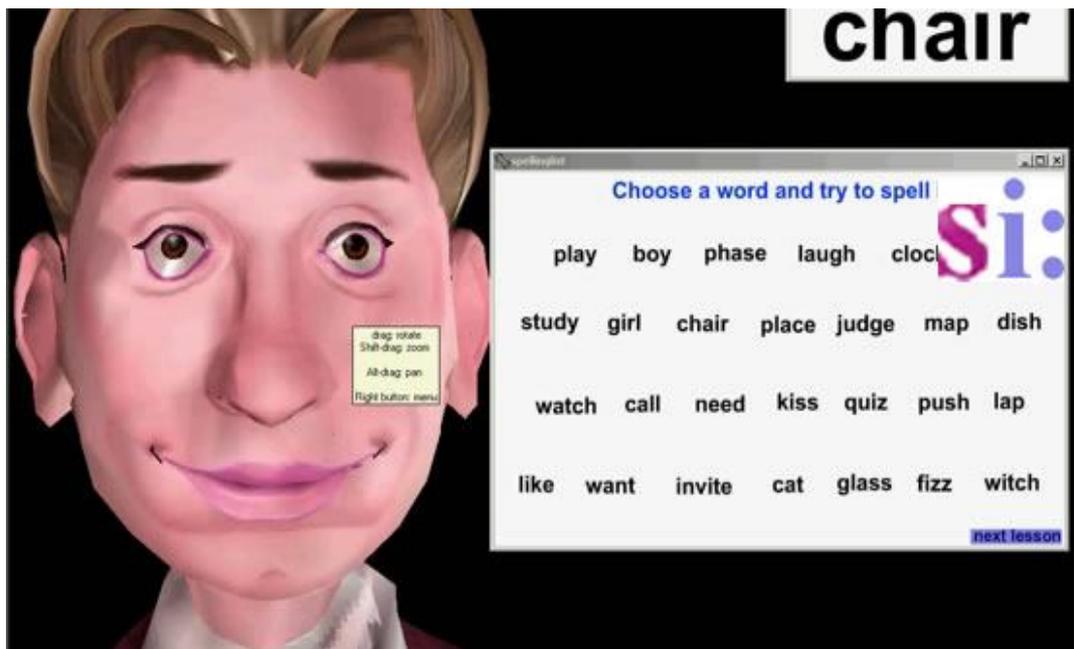


Figure 16: BALDI spelling task with phonetic prompt.

The final option on the main menu is a drill session. BALDI randomly selects a letter and phonetic spelling graphic, users must respond orally to the visual stimuli (Figure. 17). The utterances are judged as being correct or incorrect, users have no opportunity to repeat or correct these utterances.



Figure 17: BALDI drill task with phonetic prompt.

The avatar has the same user controls as the practice session (Figure. 18).

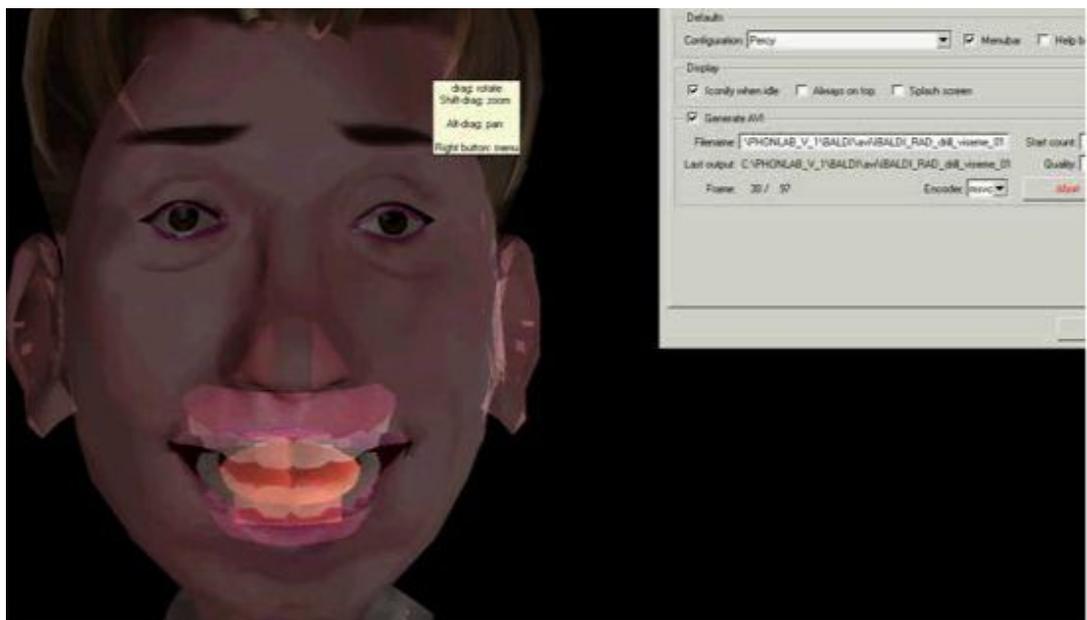


Figure 18: BALDI drill in viseme view with preferences window open.

On returning to the main menu users can exit the application by 'clicking on' the 'exit' button to return to the Flash interface.

### 3.4 Summary.

This chapter set out to describe how the observations from the literature

could be interpreted to inform the design of a rich interactive multimodal environment in which to practice phonetics. Two software design applications, Flash and the RAD toolkit, were identified as being appropriate for development of content. The tool PHONLAB was designed with a view to further enhance the user experience of the core subject.

PHONLAB was implemented in a private EFL school in Dublin for 1 week. The next chapter will describe the study and how the research questions were formed and the methodology used to interpret the findings that resulted from the implementation.

## **4 Methodology.**

### **4.1 Outline.**

This study sets out to explore the extent to which automated-speech-recognition (ASR) technology can facilitate a phonetic approach (PA) to second language acquisition (SLA). From the literature and a survey undertaken for this study it can be drawn that the practice of phonetics is considered beneficial when learning new language. A problem has been identified with student and teacher action on this knowledge; it can be argued that this is indicative of a negative attitude towards and a lack of engagement with the core subject. Another problem has been identified with current and previous classroom choral drill practices. A tool has been created to address these problems. In this chapter the methodology, data gathering tools and how the findings will be analysed are outlined. The aim is to address the four sub-questions;

- Can using PHONLAB help to improve student engagement with learning and practicing phonetics?
- Does using PHONLAB help to promote self-regulated learning strategies for practicing phonetics?
- Can using PHONLAB change user attitudes to learning phonetics?
- Do teachers see a value in using PHONLAB as a supplemental communicative activity for phonetic practice?

### **4.2 Implementation.**

The tool was implemented in the Dublin School of English (DSE), a private EFL school in Dublin, over one week in April 2008. It was agreed with academic management that the implementation could take place as part of normal course time and that teachers could be approached to volunteer their class for a single one-hour session. Eight teachers volunteered classes, one of which was used as a focus group with three sessions, one teacher brought two separate classes and facilitated one of the sessions without the assistance of the researcher. Six teachers assessed the tool through a one-hour presentation, one of whom was a visiting teacher from a school in Austria. A focus group of six students had three one-hour

sessions two of which were video recorded and a group interview was held on completion of the test. Sixty-eight students were presented the tool and guided through a single one-hour session. Three members of the academic management assessed PHONLAB as a resource to enhance the schools curriculum. A complete sample of ninety-one.

The sessions took the form of a short presentation by the researcher which described the research and the purpose of the study. Before using the tool the students completed a pre-test questionnaire which was followed by a 10 minute demonstration of the key features of the tool. After the demonstration the researcher role became that of technician and monitor of the session, the teacher role was to monitor the student's use of the content and record observational testimony. The sessions were ended after 45 minutes and students completed a post-test questionnaire.

#### **4.2.1 Caveat.**

A technical glitch was discovered during the teacher presentation session. It occurred when moving between the Flash and RAD programs, once opened the RAD application must be closed before it can be opened again, some enthusiastic users pressed the launch buttons on the Flash interface more than once creating an error message also crashing the RAD interface. A solution was found, reboot the system, this process took less than two minutes to return the student to the page they were working on, in discussion with the teachers this was considered to be a non-disruptive time, however if the disruption was longer it would be considered disruptive. Once discovered, this problem was indicated to the students during the presentation stage. Apart from Class #08, which was discussed earlier, only one disruptive intervention was noted, there were 13 reboots in total. This does, however, point to the technical limitations of the researcher/developer.

During one of the sessions with the focus group the researcher attempted to correct a minor glitch that had arisen in an earlier session. As students completed their normal session (which was staggered due to student's self-regulation) the repair was loaded onto the desktop. This worked for the first student, but failed to work on the other machines. A solution was not found during the session time and,

subsequently, the session ended after 40 minutes. The problem was resolved before the next session.

### **4.3 Methodology.**

The implementation was designed to gather information regarding the attitudes of teachers and students towards using the tool as a phonetic practice tool, also to gauge student engagement with the tool. A qualitative research strategy was employed, one of the aims of which is "*...to remain open to what a particular action, or set of actions under study, will reveal about participants' perceptions, understandings and views.*" (Phelps, Sadoff, Warburton and Ferrara, 2005, in Conneely, 2007; pg. 23). Attitudinal research is used to help reflect on current or past action and predict the possibility of future action, over time or with a large scale sample it can also be used as an indicator of trends. In terms of the present study, which has identified a problem with student and teacher attitudes to phonetic practice, the researcher set out to explore the possibility of attitudinal change mediated through technology.

### **4.4 Data collection and analysis.**

Seven streams of data were collected; teacher tool assessment, teacher session observations, focus group teacher observations, focus group pre and post-test questionnaires, focus group video session with group interview, single use student questionnaire, and academic management observational assessment. The role of the researcher was to present the tool to the students and to be available to resolve any technical problems, the role of the teacher was to facilitate the content and monitor the session.

The teacher and student questionnaires were designed to gauge pre-test and post-test attitudes and to measure any change recorded. In consideration of the student level it was decided that they would not be given open ended questions as they could lead to misinterpretation. The answer options were designed to give students and teachers a range of positive and negative responses from a multiple choice of four or five options. A pre-test question and a post-test question were designed with options that were comparable in terms of value; the findings from

these questions were compared in order to assess attitudinal change, if any, as mediated by the tool.

For analysis the student sample was sub-divided into; Complete student sample, Pre-intermediate level, Intermediate level, Focus group and Class #08. Class #08 presented itself as an inconsistent phenomenon which required further analysis. The teacher sample was sub-divided into; Complete teacher sample, teachers that tested the tool with a class and teachers that had a single use without a class. Each of the sample groupings were treated as single case studies for the purpose of this study. Data exists for a more detailed analysis for a later in-depth study which goes beyond the brief of the present research.

#### **4.4.1 Coding and Theming.**

The data from the teacher and academic management observational testimony, and a transcript of the focus group class interview, were used to address the main research question and to help form an in-depth understanding of any peculiar phenomenon that arose during the study. The researcher defined codes from notes made on the margins of the transcriptions of the observational testimony. Areas of text were labelled with keywords that were later aggregated into categories of similarity from which general themes emerged. These themes were used to inform and help develop a clearer interpretation of the findings from the questionnaires. Difficulties were found when coding from the focus group interview, this was due in part to the varied level of English among the students, however interesting themes emerged which require further study.

#### **4.5 Summary.**

In this chapter we have outlined the research methodology employed for the purpose of this study. The data collection tools have been described and the sample has been divided into groupings that reflect the difference between student levels and teacher engagement, each grouping is being considered as a single case study. In the next chapter we will analyse the data and consider the findings in terms of how they relate to answering the research questions.

## **5 Findings.**

### **5.1 Introduction.**

The previous chapter described how the data was collected and the research methodology by which it was analysed. This chapter presents the results and describes how they relate to the study being undertaken. Included are analyses of data considered relevant to the present study, for a full data record see Appendices 2/3/4. The results of the findings provide substantive evidence to support the use of ASR systems to mediate phonetic practice and answer the research sub-questions outlined previously.

### **5.2 Data analysis.**

Having identified a problem with action on the knowledge that phonetics are an important part of learning language, this study set out to answer the broad question 'To what extent can ASR technology facilitate a phonetic approach to SLA?'. Four sub-questions were proposed to help answer this question. Data was collected from seven data streams; teacher observational testament, teacher pre and post-test questionnaire, student single use pre and post-test questionnaire, student focus group questionnaire with video-recorded testament. The student sample was divided into pre-intermediate and intermediate level EFL students and further sub-divided into class groups and a focus group, each student was given a consecutive number within their class. The teacher sample was sub-divided into two groupings, those that volunteered their class as subjects and those that had a single use without a class. The members of the academic management randomly attended separate sessions and provided observational testament.

#### **5.2.1 Student engagement.**

Student engagement was considered to be a prime indicator of the tool mediating the learning experience. Data was collected through observational notes taken by the teachers during the sessions and an in-class feedback discussion after the session. Teachers were asked to take special notice of student engagement, any technical problems which interfered with the learners experience, teacher or

researcher interventions and other relevant interactions. Students were asked to complete a questionnaire about their experience of using PHONLAB.

### 5.2.1.1 Teacher observations.

#### Student Engagement with PHONLAB.

Overwhelmingly the teacher observations (Appendix 4) suggest that students were engaged with the tool “*very quickly*” after the 10 minute orientation and required little extra operational instruction indicating “*ease of use*” and the “*motivational*” attributes of the experience. From six single use observations, five reported a high level of student engagement; one reported a low level of interest due to “*technical problems*” which disrupted the experience (Class #08). The observations of the focus group also recorded a high level of engagement, which is supported by video footage. It can be extrapolated from this testament that the students were able to engage with the object without the technology getting in the way. This is indicative of the absorption of technology by the target audience and the ease of use of PHONLAB providing a platform for “*self-regulation*” and further “*learner autonomy*”.

Class #08 was part of an extended study involving the teacher taking the session himself without the assistance of the researcher. The negative response is also reflected in the class feedback for that class; “*it was boring*”, “*it’s too easy*”. It can be extrapolated that when the technology works it is “*easy to use*” and can facilitate an “*enjoyable*” engaging learning experience, however, when there are technical difficulties users are less likely to feel any benefit from the use of technology. There was a recurrent technical problem which was solvable by rebooting the system, the process took less than two minutes to return the student to the page that they were working on, this had been shown to the teacher beforehand but no other extensive training had been given, the teacher refers to this in his testament, “*Students needed lots of help setting up ([sic] prob because I’m not so familiar with the program)*”. This testament is relevant to the potential of PHONLAB as a supplemental activity, for PHONLAB to be considered as such teachers would need to be given specific training in it’s use. Two students from

Class #08 (Student A and Student B) volunteered to try the tool again and assess whether their experience showed any improvement.

### 5.2.1.2 Student questionnaire.

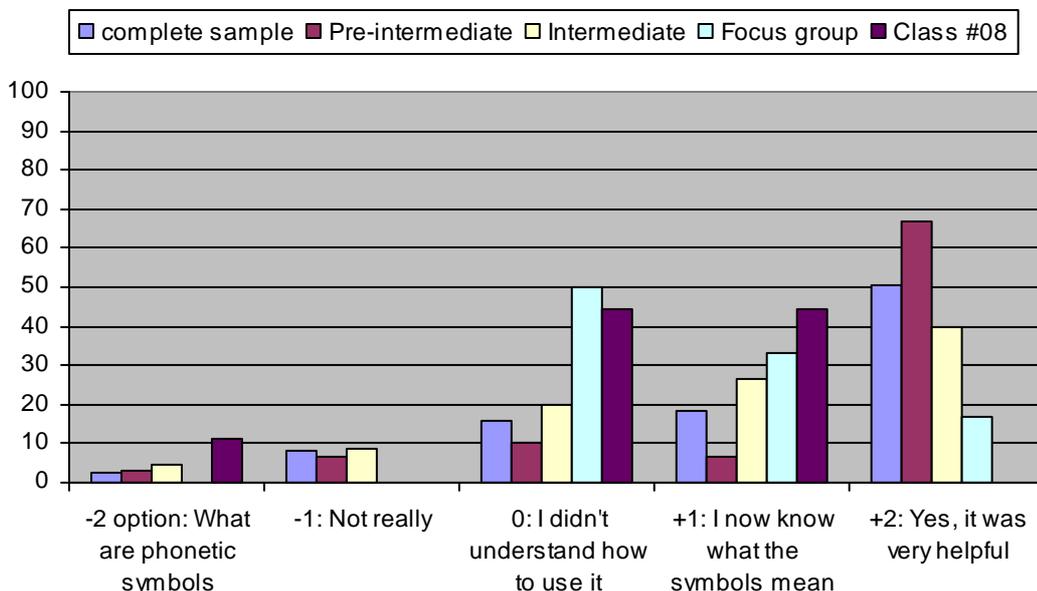
In consideration of the student level it was decided not to offer students open-ended questions as they could increase the possibility of misinterpretation. In order to gauge the student's engagement with PHONLAB two multiple choice questions were asked on completion of the session. The results are divided into; Complete sample, intermediate level, pre-intermediate level, focus group, Class #08, a significant difference is recorded between these groupings and enough evidence to enable trend prediction.

#### The first question.

The first question measures student attitudes to learning phonetics as mediated through PHONLAB on a five option multiple-choice questionnaire. Answer options were designed to give students a broad choice and were measured on a negative-positive scale -2 to +2, centred on a neutral 0 option;

*Table 1: First question, groupings percentage comparison:*

#### Did using PHONLAB help you to understand the phonetic symbols?



50% of the complete sample choose the positive +2 option indicating a high level of engagement with the tool, 18% choose the +1 option indicating a medium level of engagement and 16% indicated that they didn't know how to use it, the other options, when combined, indicated 10% were unable to use the tool as a learning experience. But when analysed through the different student levels, pre-intermediate and intermediate, a noticeable difference is recorded. This is significant in terms of the assertion from the literature that "*PM is a variable temporary state which has different requirements as the learner develops within the phonological structure of the language.*" (Gathercole & Baddeley, 1990; Gupta, 2002; O'Brien, 2007) and provides the basis for a further study beyond the scope of the present research. When the positive options are taken as a whole the difference between the levels becomes less obvious suggesting a significant difference in attitudes between the levels.

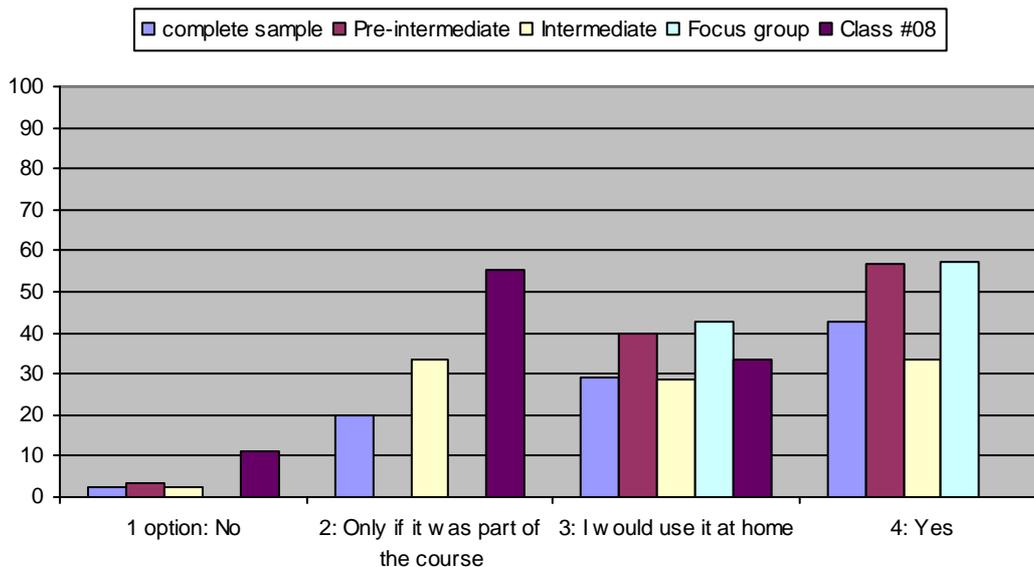
When Class #08 is reviewed in isolation it shows a result inconsistent with general findings. A further study was undertaken with two of the students from this class, Student A and Student B, to ascertain if their attitudes might change with a more informed presentation and technical assistance. Both students indicated a positive change of attitude and expressed that they now know how to use it, which improved their learning experience. This is indicative that teachers need to be trained in the use of tool before it can become a supplement to their teaching.

### **The second question;**

The second question measured how using the tool might change future attitudes to learning and practicing phonetics on a four option multiple-choice questionnaire. Answer options were designed to give students a broad choice and were measured on a 1 to 4 scale, 1 representing no wish to learn the core subject phonetics and 4 representing a positive attitude to future learning of the core subject as mediated through the tool;

*Table 2: Second question, groupings percentage comparison:*

**Would you use PHONLAB in future to help you understand phonetics?**



Analysing the complete sample shows 42% indicated a positive attitude towards using the tool in the future, 29% would prefer using the tool at home indicating the facilitation of self-regulation, 20% indicated that they would only use PHONLAB if it was part of the course, 2.6% did not show any willingness to use PHONLAB in future. A significant difference is noted between the different levels;

These findings support the evidence from the first question that there is a significant difference in attitudes between the levels. A similar significant percentage from each group showed a willingness to use the tool at home indicating that the wish for self-regulation spans both levels. As with the first question a significant inconsistency is noted between results for Class #08 and the general response. There is a consistency within all groups of the percentage of students that would use the tool at home. It could be argued that the similarity in percentage could be indicative of a wider social trend to self-regulation mediated through technology for use at home, or outside the classroom.

### 5.2.1.3 Summary.

Evidence from the teacher observational testament and student questionnaire would suggest that engagement with the tool was high, answering the first research sub-question;

Can PHONLAB help to increase student engagement with learning phonetics?

Other substantive evidence has emerged which identifies a marked difference in attitudes between levels, supporting the assertion from the literature that PM has different needs as the learner develops within the language. There is also strong evidence to suggest that a sizeable percentage of students would use the tool at home which, It could be argued, is indicative of a social trend to self-regulated learning practices mediated through technology. Both of these areas could form the basis for more detailed studies.

### **5.2.2 Attitude shift.**

Having shown that using PHONLAB was an engaging learning experience a further analysis was undertaken to assess whether using the tool had changed students attitude to the core subject of phonetic practice. Before engaging with the tool students were asked to complete a questionnaire regarding their pre-test opinion of phonetics and phonetic practice. Two of the questions addressed the student's prior knowledge and opinions to using phonetics. When compared with the results of the post-test questionnaire a positive shift in attitudes was recorded. Data was collected through the student questionnaire and analysed in the groupings; Complete sample, intermediate level, pre-intermediate level, focus group, Class #08, a significant similarity is recorded between these groupings and enough evidence to enable trend prediction.

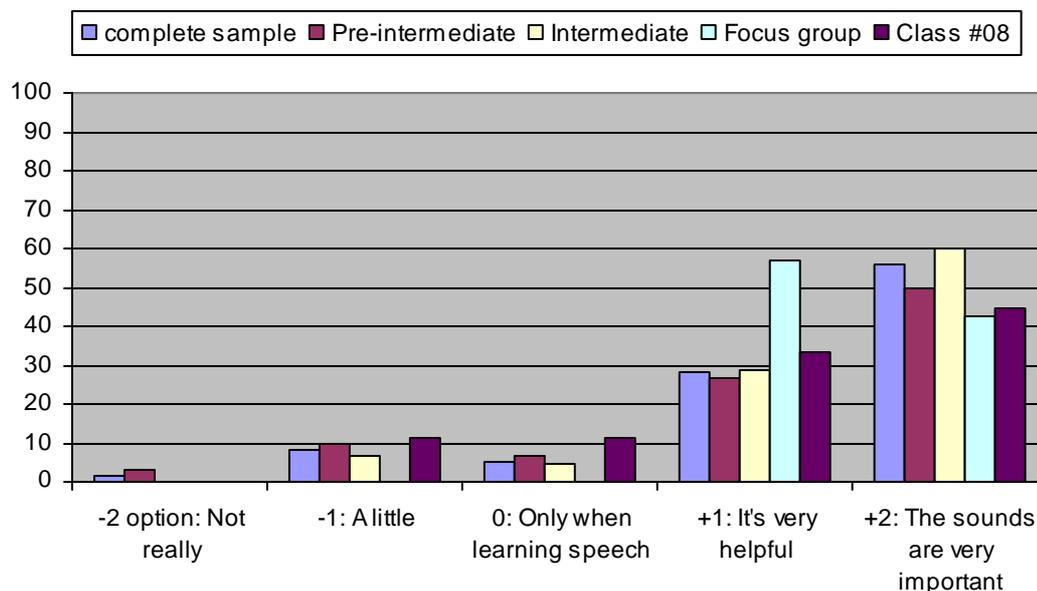
#### **5.2.2.1 Pre-test attitudes.**

##### **The third question.**

The third question measures student attitudes to understanding the core subject before using the tool on a five option multiple-choice questionnaire. Answer options were designed to give students a broad choice and were measured on a negative-positive scale -2 to +2, centred on a neutral 0 option;

Table 3: Third question, groupings percentage comparison:

**Do you think it is important to know the sounds of a language?**



56% of students consider learning of the core subject to be very important when learning language, 28% considered it very helpful to know phonetics and a further 15% had a negative opinion towards the use of the phonetics as a learning tool. Significant similarities are recorded between the student levels and also when analysed through the focus group, and Class #'08 groupings. Significantly the Class #08 findings are not inconsistent with the general opinion. The similarity and consistency of the result patterns would suggest that students see an importance in learning the core subject.

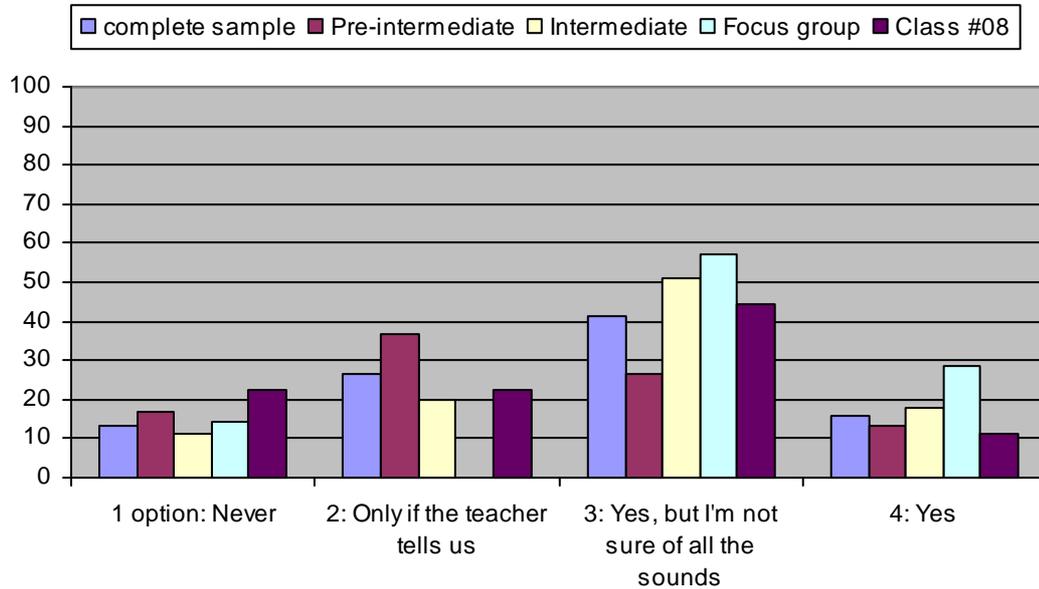
**Fourth question.**

Having established that students understand the importance of learning the core subject, it is important to gauge their attitude to acting on this knowledge. The fourth question measured attitudes to learning and practicing phonetics before using the tool. Using a four option multiple-choice questionnaire, answer options were designed to give students a broad choice and were measured on a 1 to 4 scale, 1 representing a negative attitude and 4 representing a positive attitude to learning of the core subject before using the tool. The findings from the complete sample show a significant difference between the importance of learning the core subject as recorded in the third question and the action of the students based on this

knowledge.

*Table 4: Fourth question, groupings percentage comparison:*

**Do you use phonetics to help understand how to say new vocabulary?**



The complete sample showed that 42% used the symbols to help them understand how to say new vocabulary, but their understanding was limited by a lack of knowledge of the sounds represented by the symbols, 26% only used the phonetic symbols when instructed to do so, 16% always used the symbols and 13% never used the symbols.

A significant difference is recorded between the levels. Intermediate level students show more knowledge of, and interest in using phonetics to learn new vocabulary than pre-intermediate students. A consistency is noted with the focus group and Class #08 students in comparison with the general intermediate level findings.

The findings from the third and fourth questions indicate that students understand the importance of learning the core subject, but their attitude to acting on this knowledge is inhibited by their lack of understanding of the phonetic sounds.

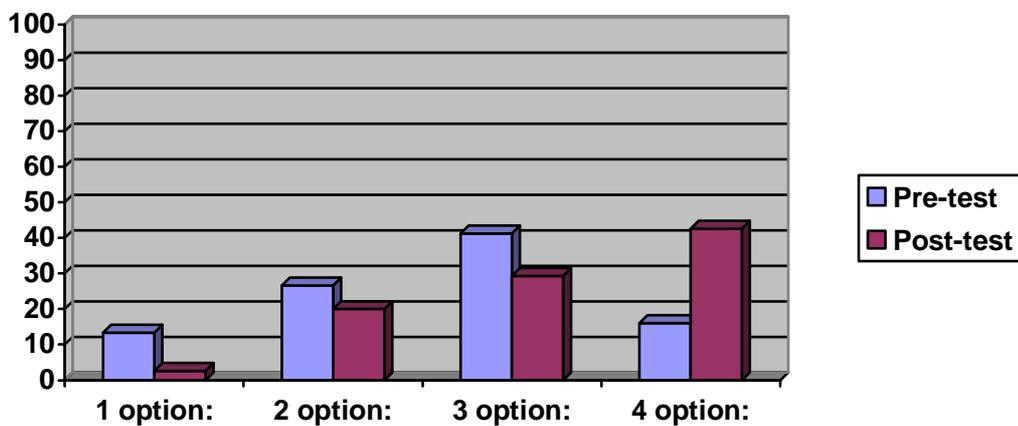
**5.2.2.2 Comparing pre and post-test attitudes.**

To gauge whether a change in attitude was recorded the post-test second

question and pre-test fourth question were compared to identify any change between the pre and post-test attitudes.

A negative-positive unit value was given to each of the options on the questionnaire as follows: the fourth question options were valued Never = 1, Only if the teacher tells us = 2, Yes, but I'm not sure of all the sounds = 3 and Yes = 4; the second question options were valued No = 1, Only if it was part of the course = 2, I would use it at home = 3 and Yes = 4. A percentage analysis shows an increase in the attitude towards learning the core subject as mediated through the tool.

*Table 5: Pre and post-test student attitude comparison:*



### 5.2.2.3 Summary.

Evidence from the third question showed that students consider the core subject to have importance for learning new language, but the evidence from the fourth question shows that significant numbers of students were not motivated to act on this knowledge. As a measure of attitudinal change the results of the pre-test fourth question were compared with the post-test second question, a significant positive difference was recorded consistent across the complete sample with the exception of Class #08. The difference is enough to allow a claim of attitude shift mediated through use of the tool in answer to the second research question "Does using PHONLAB change user attitudes to learning phonetics?".

### 5.2.3 Supplemental communicative activity.

Having established that student engagement with and attitudes towards

learning phonetics have shown positive signs of difference when mediated by the tool, a third stream of data was employed to assess if teachers considered PHONLAB to have value as a supplement to their teaching and whether their own attitudes to teaching the core subject had changed. Data was collected through the pre and post-test teacher questionnaire and testament. For analysis the sample was divided into two groups, 7 that used PHONLAB as part of a class and 6 that had a single use without a class. This data was analysed in an attempt to address the fourth research question;

Do teachers see any value in using PHONLAB as a supplemental communicative activity?

#### **5.2.3.1 Teacher attitudinal questionnaire.**

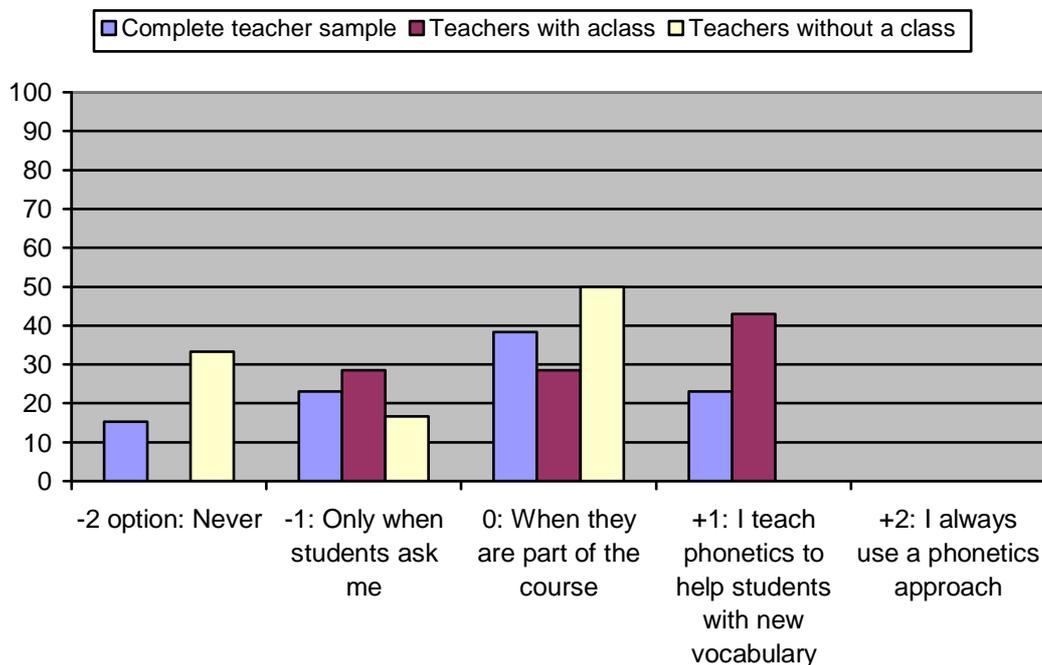
The teacher questionnaire was sub-divided into two sections, pre-test and post-test. The multiple-choice answers were designed to offer respondents a broad choice of positive and negative options. First we will address the pre-test attitudes; we will then compare the findings with the post-test attitudes and record any difference.

##### **First teacher's question.**

The first teachers question measures current teacher practice in relation to teaching the core subject, on a five option multiple-choice questionnaire. Answer options were designed to give teachers a broad choice and were measured on a negative-positive scale -2 to +2, centred around a neutral 0 option, -2 representing no importance to teaching the core subject and +2 representing a high level of importance to teaching the core subject;

Table 6: First teachers question, groupings comparison:

### Do you teach phonetics?



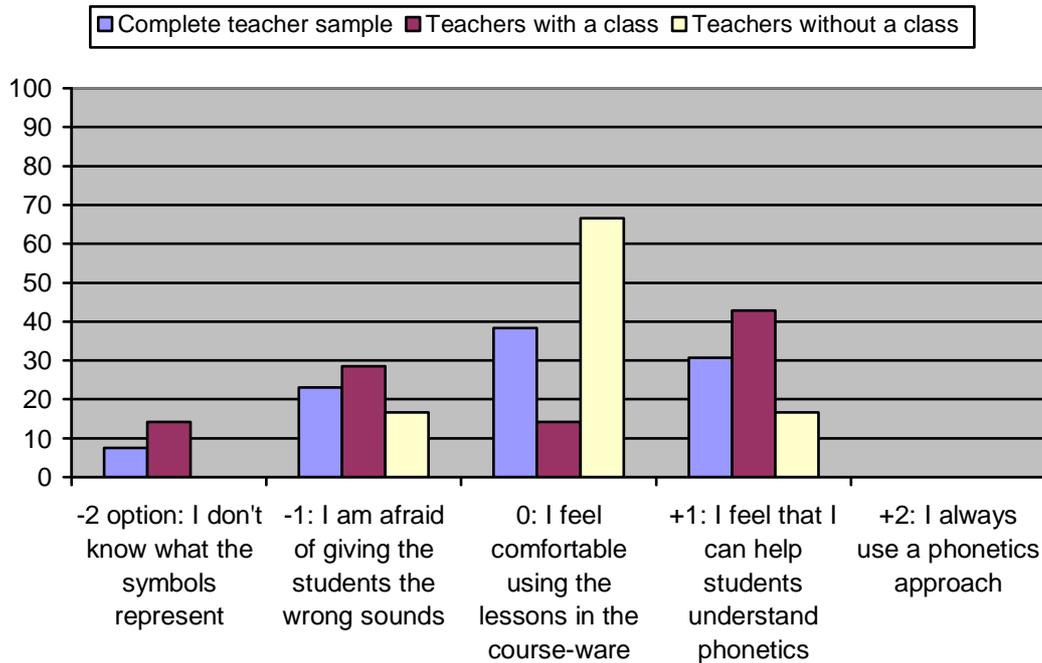
38% of the complete sample choose the 0 option indicating that they would teach the core subject only if it was part of the course-ware, 23% choose the -1 option, and an equal percentage choose the +1 option, 15% choose the -2 option and no teacher choose the +2 option. It can be extrapolated that teachers as a whole have no significant interest in teaching phonetics. Analysis of the two groupings, however, shows a significant difference of attitudes. An indication that may be drawn from this analysis is that teachers that felt comfortable with phonetics were more likely to volunteer their class as a subject.

### Second teacher question.

The second teachers question measures teacher confidence in relation to teaching the core subject on a five option multiple-choice questionnaire. Answer options were designed to give teachers a broad choice and were measured on a negative-positive scale -2 to +2, centred on a neutral 0 option, -2 representing no confidence teaching the core subject and +2 representing a high level of confidence teaching the core subject;

Table 7: Second teachers question, groupings comparison:

**How do you rate your confidence teaching phonetics?**



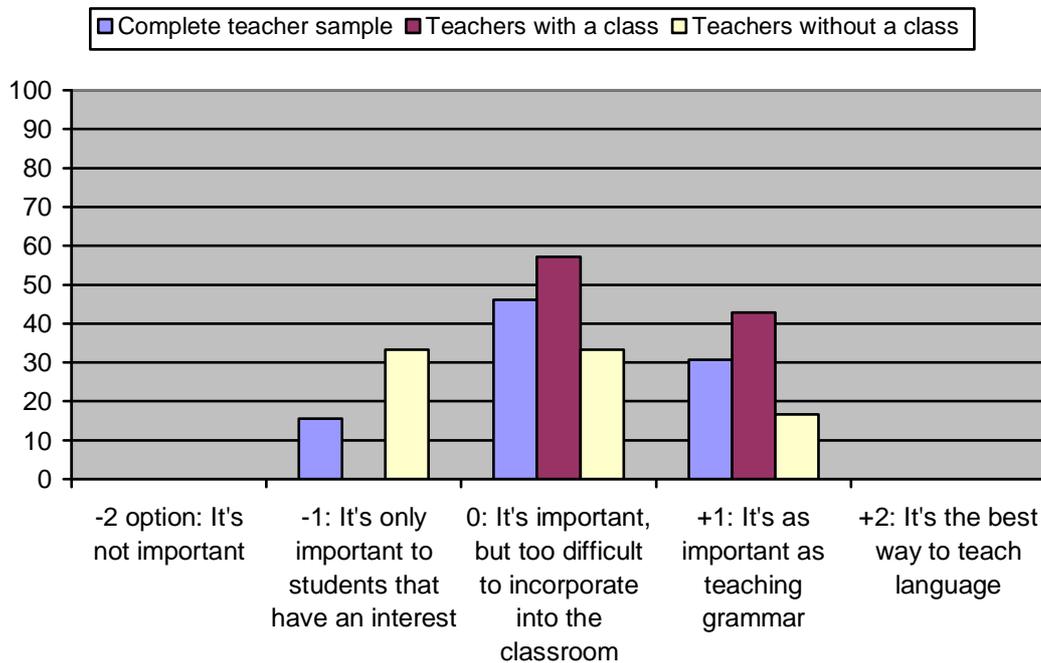
38% choose the 0 option indicating that they feel confident when using the course-ware to teach the core subject, 31% choose the +1 option, and 23% choose the -1 option, 7.5% choose the -2 option and no teacher choose the +2 option. It can be extrapolated that teachers as a whole have no significant confidence in teaching phonetics. Analysis of the two groupings, however, showed a significant difference of attitudes. This comparison further supports the findings from the first teacher question, that teachers that felt confident teaching phonetics were more likely to volunteer their class as subjects for the test.

**Third teacher question.**

The third teachers question measures the importance given to teaching the core subject on a five option multiple-choice questionnaire. Answer options were designed to give teachers a broad choice and were measured on a negative-positive scale -2 to +2, centred on a neutral 0 option, -2 representing no importance to teaching the core subject and +2 representing a high level of importance to teaching the core subject;

Table 8: Third teachers question, groupings comparison:

**How important do you rate phonetic teaching?**



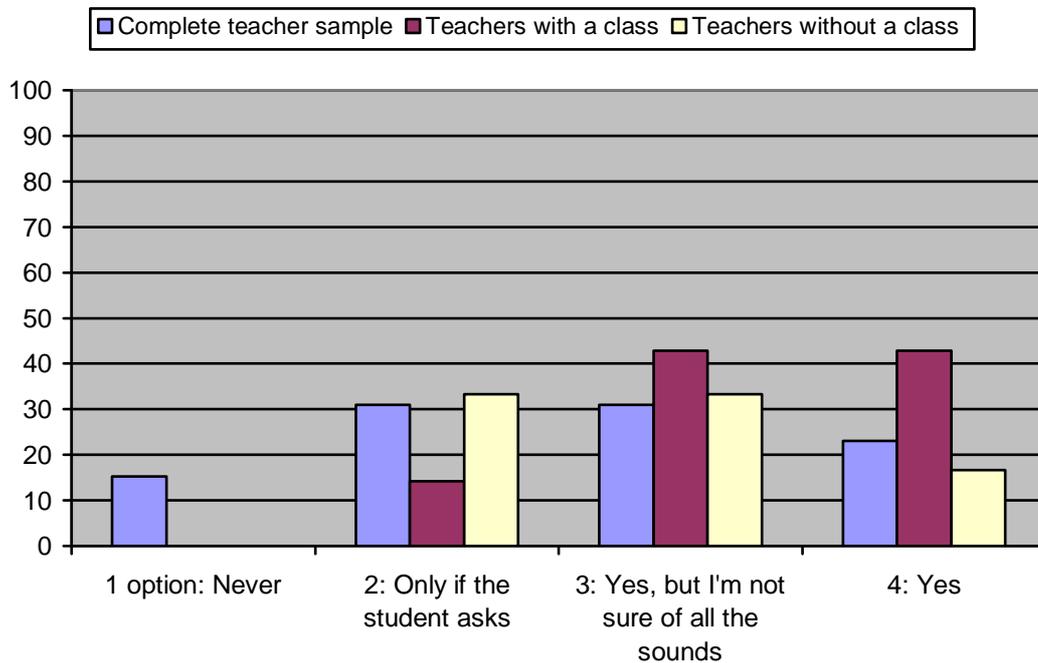
46% choose the 0 option indicating that they feel that teaching the core subject is important but too difficult to incorporate into the classroom, 31% choose the +1 option, and 15% choose the -1 option, no teacher choose either the -2 or +2 options. This evidence gives support to the problem identified earlier in this paper that teachers are experiencing difficulties when addressing phonetics in the classroom. The reasons for this phenomenon are beyond the scope of this study, but worth noting in relation to the importance placed on phonetics by the teachers and in comparison with the findings addressed later in this chapter. An analysis of the teacher groupings reflected the findings of the first and second teacher questions.

**Fourth teacher question.**

The fourth question measured teacher attitudes to using phonetics to teach new vocabulary using a four option multiple-choice questionnaire. Answer options were designed to give teachers a broad choice and were measured on a negative-positive 1 to 4 scale, 1 representing no use of phonetics to teach new vocabulary and 4 representing a positive attitude to using phonetics to teach new vocabulary.

Table 9: Fourth teachers question, groupings comparison:

**Do you use phonetics to help teach new vocabulary?**



The complete teacher sample indicated that 31% used the symbols to help teach new vocabulary, but their understanding was limited by a lack of knowledge of the sounds represented by the symbols, an equal percentage only used the phonetic symbols when asked to do so, 23% always used the symbols and 15% never used the symbols. These findings are indicative of a broad range of attitudes among teachers to teaching the core subject. A comparative analysis of the teacher groupings shows a significant difference between them;

The data collected and analysed in this sub-chapter is used to form an understanding of teacher's attitudes to teaching the core subject before accessing the tool. The results show that teachers are aware of the importance of phonetics, find it hard to incorporate phonetic teaching into the classroom, have a broad range of attitudes to phonetic teaching and show no significant amount of interest in teaching the core subject. It has also been noted that there is a significant difference in attitudes between the teachers that volunteered their class as subjects and those that did not.

### **5.2.3.2 Post-test analysis.**

To gauge a change in teacher attitudes a post-test teacher questionnaire was completed. Two questions were asked regarding teacher attitudes to teaching phonetics.

#### **Fifth teacher question.**

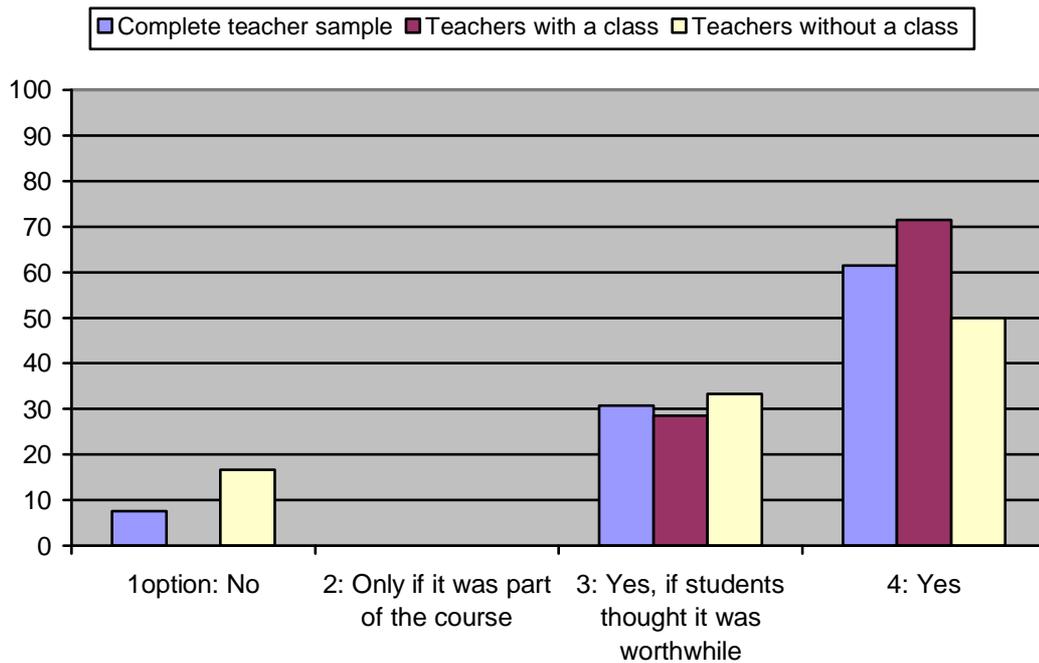
The fifth teacher question measures teacher improvement of understanding of phonetics gained through the tool on a five option multiple-choice questionnaire. Answer options were designed to give teachers a broad choice and were measured on a scale -2 to +2, -2 representing no improvement of knowledge of the core subject and +2 representing a high level of improvement within the core subject as mediated through the tool. Four teachers did not complete this question, however, two wrote explanations that they already knew the symbols, the remaining teachers all choose the +2 option "Yes, it is very helpful.". The overwhelming indication is that teachers believed the tool would help them to understand the phonetic symbols.

#### **Sixth teacher question.**

The sixth teacher question measured how using the tool might change teacher's future attitudes to teaching phonetics as a supplement to classroom teaching methods on a four option multiple-choice questionnaire. Answer options were designed to give teachers a broad choice and were measured on a negative-positive 1 to 4 scale, 1 representing no wish to use PHONLAB as a supplement and 4 representing a positive attitude to using PHONLAB as a supplement to future teaching of the core subject;

*Table 10: Sixth teachers question, groupings comparison:*

**Would you use PHONLAB as a supplement to help you when teaching phonetics?**



61% chose the positive 4 option, 30% chose the positive 3 option, no teacher chose the negative 2 option and 8% chose the negative 1 option. An analysis of the two teacher groupings showed a pattern consistent with the general opinion.

### 5.2.3.3 Pre and post test questionnaire analysis.

To gauge whether a change in attitude was recorded the pre-test fourth question and the post-test sixth question were compared to identify any change from the pre to the post-test attitudes. A unit value was given to each of the options on the questionnaire as follows: the fourth question options were valued Never = 1, Only if the student asks me = 2, Yes, but I'm not sure of all the sounds = 3 and Yes = 4; the sixth question options were valued No = 1, Only if it was part of the course = 2, Yes, if the students thought it was worthwhile = 3 and Yes = 4. A simple total of the amount of times each option was chosen provided the percentage result for each option which was then measured against the corresponding choice. The difference is significant, consistent between groupings, shows an increase in the attitude towards teaching the core subject as mediated through the tool and a willingness to consider using PHONLAB as a supplement to their classroom teaching. The most significant change is within the grouping of teachers that had not volunteered a class as subjects.

Table 11: Pre and post-test teacher attitudinal comparison:

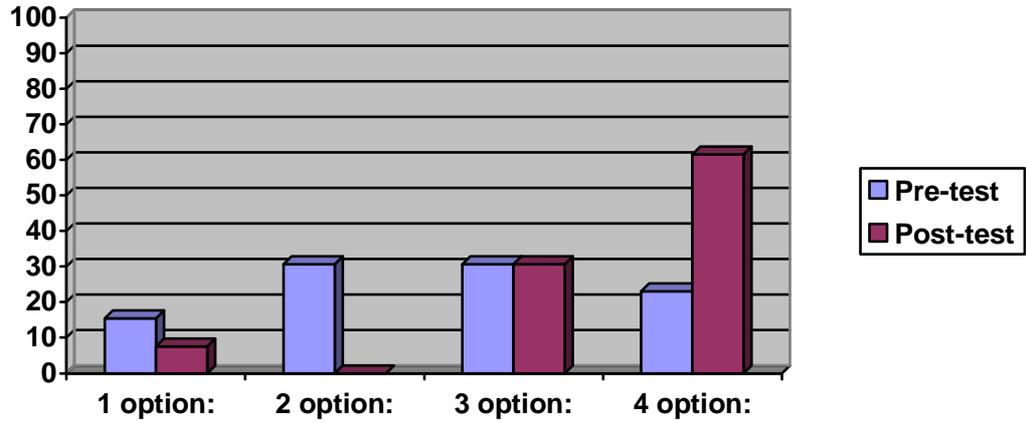


Table 12: Pre and post-test teacher with a class attitudinal comparison:

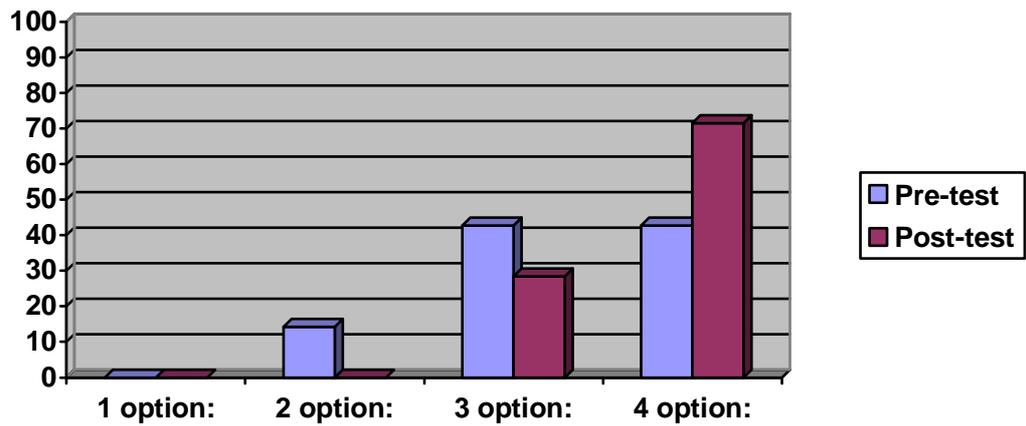
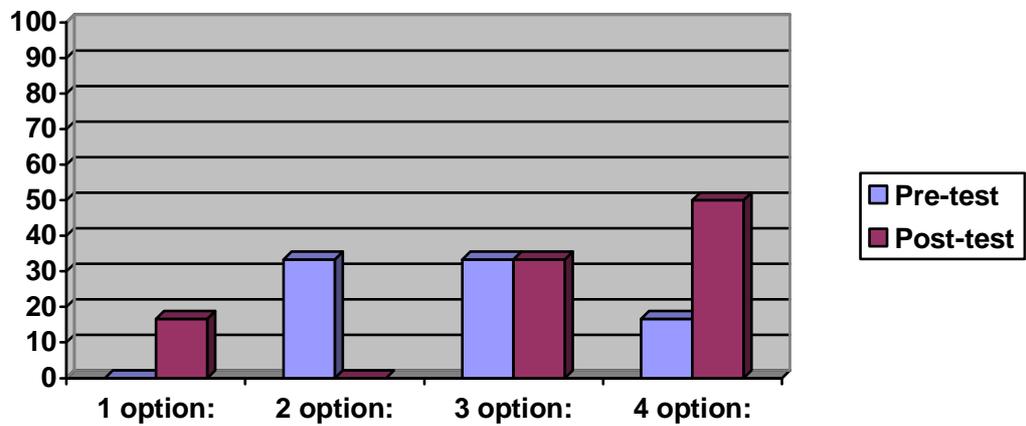


Table 13: Pre and post-test teacher without a class attitudinal comparison:



#### **5.2.3.4 Summary.**

This sub-chapter set out to answer the third research question "Do teachers see any value in using PHONLAB as a supplemental communicative activity?". Data was gathered through a pre and post-test questionnaire. The extensive pre-test questionnaire found that teachers showed no significant interest in teaching the core subject. A further analysis of the two teacher groupings showed a significant difference in opinion towards teaching phonetics between the teachers that had volunteered their class as subjects and those that had not. When findings from a pre-test question were compared with a corresponding post-test question a significant positive increase was shown in teacher attitudes to teaching phonetics and a significant percent would consider using PHONLAB as a supplement to their teaching, answering the third research question.

### **5.3 Chapter summary.**

A problem has been identified with EFL student and teacher attitudes to phonetic teaching and practice. Applying ASR technologies affords the possibility of addressing this problem. The broad research question was asked;

To what extent can automated-speech-recognition technology facilitate a phonetic approach to second language acquisition?.

A rich multimodal tool, PHONLAB, has been created using Flash 8 and incorporating an avatar, BALDI, with pre-recorded automated responses, as a phonetic practice tool. The tool was implemented in a private EFL school in Dublin over one week in April, 2008. A study was undertaken to address the four research sub-questions;

- Can PHONLAB help to increase student engagement with learning phonetics?
- Can PHONLAB be used to promote self-regulated learning strategies?
- Does using PHONLAB change user attitudes to learning phonetics?
- Do teachers see any value in using PHONLAB as a supplemental communicative activity?

In this chapter the data collected from three data streams, teacher observational testament, student questionnaire and teacher questionnaire, was analysed in terms of the research questions and it was found that;

- Using PHONLAB can increase student engagement in learning phonetics.
- Teacher observational testament points to learners adopting a self-regulated approach.
- Using PHONLAB showed a positive change in user attitudes, both teacher and student.
- Having used the tool teachers showed a positive attitude towards using it in future as a supplemental activity.

In the final chapter the findings will be discussed in relation to second language pedagogy. Limitations of the current research will be addressed and an outline for future studies considered.

## **6 Conclusion.**

### **6.1 Introduction.**

This study set out to explore the extent to which automated-speech-recognition (ASR) technology could facilitate a phonetics approach (PA) to second language acquisition (SLA). It follows on from a study by O'Brien (2007) in which phonological memory (PM) skills are shown to be a predictor of further language learning skills in adult SLA. Oral practice within the new language has been shown to be beneficial to learning grammar and syntactic structure. A problem has been identified with teacher and student attitudes to current classroom phonetic practice, and with choral drill exercises. PHONLAB was designed to address this problem. A qualitative study was undertaken which employed the use of teacher observational testimony, teacher and student pre and post-test questionnaires. The findings of the research have been outlined in relation to the research questions which have been addressed. In this chapter the findings will be discussed in terms of their relation to language learning pedagogy.

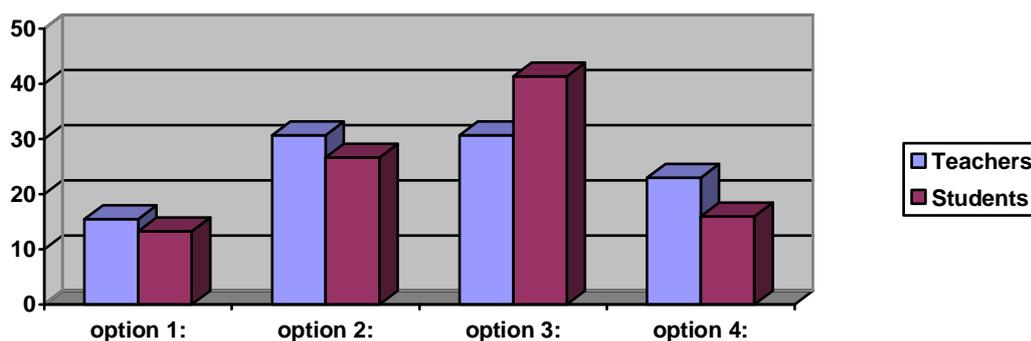
### **6.2 Liberation technology.**

Within a DST perspective, the individual learner is the catalyst for their further learning and it is by their action that the path to their learning is initiated (de Bot, et al, 2007; Van Geert, 2004). It has been shown that students that actively engage with a task gain more from the task and that engagement is predictive of further learning gain (Mackey, 2004;) . In Chang (2007) it is noted that using a self-regulated strategy is "*...positively correlated with motivation perception.*" (pg,; 220). Motivation is also important when considering engagement and attitudes towards learning a particular subject. It is indicated through the teacher observational testimony that students showed a high level of engagement with the tool, this is supported by the attitude shift noted in the student pre and post-test questionnaire.

The findings from the questionnaire reveal that all groupings, teachers and students, identify the core subject, phonetics, as an important scaffold to achieving the learner objective, learning how to 'speak' English. However, it is also indicated that motivation and attitudes towards acting on this knowledge are significantly

lower. When using a comparative analysis on teacher and student attitudes an interesting observation was made;

*Table 14: Comparison between student and teacher questionnaire showing significant similarities to a question with similar responses. It could be argued that this is indicative that student's attitudes are directly related to teacher attitudes.*



Significant similarities were found that could indicate that student attitudes are directly influenced by their teacher's attitudes. These findings will be considered in more detail and lay the basis for a further paper. This limited study has shown that technology can address this problem. A significant number of teachers indicated a positive attitudinal shift to using a phonetics approach in future mediated through the tool. A significant number of teachers also indicated that they would use PHONLAB if it was part of the course-ware and a significant number of students indicated a positive attitude towards using PHONLAB at home.

To what extent can ASR technology mediate a phonetic approach to SLA?

In this limited study it has been indicated that technology can facilitate self-regulated learning strategies when used as a supplemental communicative activity for learning phonetics as part of an EFL course in Ireland. Technology can mediate a change in teacher and student attitudes to teaching and learning phonetics. Technology can address a classroom problem providing the platform by which an important but difficult area of language acquisition can be reinstated into the course-ware. Teacher testimony indicates that students found other functions such as change character, voice and emotions which they enjoyed, this indicates usability and levels of freedom of discovery are high and that students are becoming

liberated in use of technologies. One of the students was a 68 year old nun from Austria, she required no further assistance other than the 10 minute introduction to the class. Speech recognition technology can liberate the student and teacher by providing a rich multimodal interactive self-regulated environment in which to learn about, practice, and subjectively assess phonetics.

Recent advances in the field of speech recognition technologies (SRT) have made it possible to create interactive voice-responsive applications which provide a basis for the development of human-computer oral interaction. The adoption of 'VoiceXML' by the Web 3 Consortium (W3C) points to an environment where speech/computer interaction is fast becoming a reality providing further access to users with limited keyboard or mouse skills (Privat, et al, 2002). Marshall McLuhan in "The medium is the message" (1967) describes "*The spoken word was the first technology by which man was able to let go of his environment in order to grasp it in a new way.*". Speech technologies allow many more people to access content and once again speech has the power to liberate man in order to grasp his environment and open up the possibilities of human to computer communication.

### **6.3 Limitations.**

The research was conducted over a short time which limits the findings to general analysis; however a large enough sample was recorded to enable extrapolation of general pointers. Further data streams were recorded within the tool which were not considered necessary for evaluation for this paper. The data has been stored and will form the basis for further analysis.

### **6.4 Further research.**

This paper is not considered as an end point and further analysis of the findings is currently being considered. The findings presented here are considered as preliminary and display general trends. Further data was recorded in the student questionnaire which allows for further detailed classifications; class within level, individual within class, Nationality trends. Further audio data was recorded during the sessions within the tool. All of the students verbal and 'click on' interactions with the BALDI interface are recorded in a student folder created on login. The sound

files are saved as '.wav' and the 'click on' interactions are saved within a '.html' page which also accesses the '.wav' files.

The RAD application is extensive in the range of opportunities it provides to the researcher, developer and the front end user. This study has only touched on one small aspect of the range of possibilities it affords.

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## **APPENDICES**

# Appendix 1: The International Phonetic Alphabet.

## THE INTERNATIONAL PHONETIC ALPHABET (2005)

### CONSONANTS (PULMONIC)

	Bilabial	Labio-dental	Dental	Alveolar	Post-alveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Epi-glottal	Glottal
Nasal	m	ɱ	n			ɳ	ɲ	ŋ	ɴ			
Plosive	p b	ɸ β	t d			ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ	ʕ
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	ħ ʕ	h ɦ
Approximant		ʋ	ɹ			ɻ	j	ɰ				
Trill	ʙ		r						ʀ		ʀ	
Tap, Flap		ⱱ	ɾ			ɽ						
Lateral fricative			ɬ ɮ			ɮ̝	ɬ̝	ɮ̥				
Lateral approximant			l			ɭ	ʎ	ʟ				
Lateral flap			ɺ			ɻ̤						

Where symbols appear in pairs, the one to the right represents a modally voiced consonant, except for murmured *f*. Shaded areas denote articulations judged to be impossible. Light grey letters are unofficial extensions of the IPA.

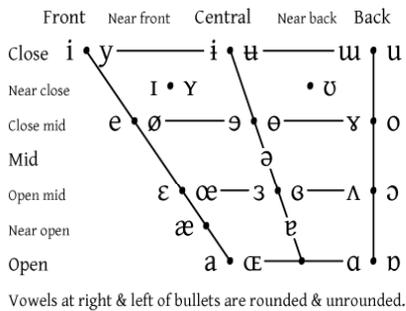
### CONSONANTS (NON-PULMONIC)

Anterior click releases (require posterior stops)	Voiced implosives	Ejectives
⦿ Bilabial fricated	ɓ Bilabial	ʼ Examples:
ɮ Laminar alveolar fricated ("dental")	ɗ Dental or alveolar	ɓ' Bilabial
ɮ̠ Apical (post)alveolar abrupt ("retroflex")	ɟ Palatal	ɗ' Dental or alveolar
ɮ̠̠ Laminar postalveolar abrupt ("palatal")	ɠ Velar	ɠ' Velar
ɮ̠̠̠ Lateral alveolar fricated ("lateral")	ɡ Uvular	ɡ' Alveolar fricative

### CONSONANTS (CO-ARTICULATED)

- ɱ Voiceless labialized velar approximant
- ʋ Voiced labialized velar approximant
- ɥ Voiced labialized palatal approximant
- ɕ Voiceless palatalized postalveolar (alveolo-palatal) fricative
- ʑ Voiced palatalized postalveolar (alveolo-palatal) fricative
- ɧ Simultaneous x and f (disputed)
- kp̚ ts̚ Affricates and double articulations may be joined by a tie bar

### VOWELS



### SUPRASEGMENTALS

- ˈ Primary stress
- ˌ Secondary stress [ˌfoʊnəˈtʃən]
- eː Long
- e Short
- Syllable break
- INTONATION
- ˌ Minor (foot) break
- ˎ Major (intonation) break
- ↗ Global rise
- ↘ Global fall

### TONE

- ˥ Extra stress
- ˦ Level tones
- ˧ Top
- ˨ High
- ˩ Mid
- ˪ Low
- ˫ Bottom
- Tone terracing
- ˧˥ Upstep
- ˧˩ Downstep
- ˥˩ Rising
- ˥˨ Falling
- ˥˧ High rising
- ˥˩ Low rising
- ˥˨ High falling
- ˥˩ Low falling
- ˥˧ Peaking
- ˥˩ Dipping

### DIACRITICS

Diacritics may be placed above a symbol with a descender, as *ɲ̥*. Other IPA symbols may appear as diacritics to represent phonetic detail: *tʰ* (fricative release), *bʰ* (breathy voice), *ʔa* (glottal onset), *ə̯* (epenthetic schwa), *o̯* (diphthongization).

SYLLABICITY & RELEASES		PHONATION		PRIMARY ARTICULATION		SECONDARY ARTICULATION			
ɲ̥ ɳ̥	Syllabic	ɲ̥ ɳ̥	Voiceless or Slack voice	t̚ b̚	Dental	tʷ dʷ	Labialized	ɔ̞ ɣ̞	More rounded
e̞ ɔ̞	Non-syllabic	ɰ̞ ɟ̞	Modal voice or Stiff voice	t̚ ɖ̚	Apical	tʲ dʲ	Palatalized	ɔ̞ ɣ̞ʷ	Less rounded
tʰ h̥	(Pre)aspirated	ɲ̠̠̠	Breathy voice	t̚ ɖ̚	Laminar	tˠ dˠ	Velarized	ẽ ʒ̠	Nasalized
d̠	Nasal release	ɲ̠̠̠	Creaky voice	ɯ̚ ɟ̚	Advanced	tˠ dˠ	Pharyngealized	ɤ̠ ɣ̠	Rhoticity
d̠	Lateral release	ɲ̠̠̠	Strident	ɿ̚ ɟ̚	Retracted	ɬ̠ ʒ̠	Velarized or pharyngealized	ɛ̠ ɣ̠	Advanced tongue root
t̚	No audible release	ɲ̠̠̠	Linguolabial	ä̚ ʝ̚	Centralized	ũ̚	Mid-centralized	ɛ̚ ɣ̚	Retracted tongue root
ɛ̞ β̞	Lowered (β̞ is a bilabial approximant)	ɛ̞ ɟ̞		ɛ̞ ɟ̞	Raised (ɟ̞ is a voiced alveolar non-sibilant fricative)				

ɪ READ	ɪ SIT	ʊ BOOK	uː TOO	ɪə HERE	eɪ DAY	John & Sarah Free Materials 1996	
e MEN	ə AMERICA	ɜː WORD	ɔː SORT	ʊə TOUR	ɔɪ BOY	əʊ GO	
æ CAT	ʌ BUT	ɑː PART	ɒ NOT	eə WEAR	aɪ MY	aʊ HOW	
p PIG	b BED	t TIME	d DO	tʃ CHURCH	dʒ JUDGE	k KILO	g GO
f FIVE	v VERY	θ THINK	ð THE	s SIX	z ZOO	ʃ SHORT	ʒ CASUAL
m MILK	n NO	ŋ SING	h HELLO	l LIVE	r READ	w WINDOW	j YES

A typical example of an English PC with *word keys*

## Appendix 2: Student questionnaire and analysis.

# phonlab

### STUDENT QUESTIONNAIRE

Please answer the following questions

What is your Nationality:

What is your first language;

Do you speak any other languages:

What is your reason for learning English:

What is your level of English:

Begginer    Elementary    Pre-Intermediate    Intermediate    Upper Intermediate    Advanced

Do you speak English outside the classroom;

Never    Only when someone talks to me.    I try to speak when I feel confident about the language    I always try to use the English I know    Always

How do you rate your ability to speak English;

I don't try    Not good people don't understand what I say    People always ask me to repeat what I say.    People understand what I say    Perfect

How do you rate your ability to understand native speakers in conversation:

I don't understand what's being said    I ask people to write down any words i don't understand    It's difficult, but if people speak slow I can understand them    I understand what people say.    Perfect

Student questionnaire page 1

# phonlab

## STUDENT QUESTIONNAIRE

Do you know what the phonetic chart is:

It's a type of mobile phone	It's a place to find telephone numbers	It's a list of phonetic symbols	It's a game	Don't know
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How do you rate your ability to recognise the phonetic symbols:

What are phonetic symbols	They look like a funny new language	I know what they are but not how to use them	I am able to recognise a lot of the symbols	I know all the symbols and sounds
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you think it is important to know the sounds of a language:

Not really	a little	Only when learning speech	It's very helpful	The sounds are very important
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you use phonetics to help understand how to say new vocabulary;

Never	only if the teacher tells me	Yes, but I'm not sure of all of the sounds	Yes
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### POST TEST

Did using PHONLAB help you to understand the Phonetic symbols

What are phonetic symbols	Not really	I didn't understand how to use it	I now know what the symbols mean	Yes, it is very helpful
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Would you use PHONLAB in future to help you understand phonetics:

No	Only if it was part of the course	Yes, if students thought it was worthwhile	Yes
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Analysis: Complete student sample.

The following charts list the percentage of the complete student sample that chose each option as recorded by the student questionnaire. The chart reflects the options for each question as they are listed left-to-right on the questionnaire.

### Pre-test questionnaire:

Questions: Sample = 75	-2 Option %	-1 Option %	0 Option %	+1 Option %	+2 Option %
Do you speak English outside the classroom: (1 x non-respondent)	1.3	16	26.6	44	10.6
How do you rate your ability to speak English: (1 x non-respondent)	1.3	8	28	60	-
How do you rate your ability to understand native speakers in conversation: (3 x non-respondents)	2.6	4	78.6	12	-
Do you know what the phonetic chart is: (2 x non-respondents)	1.3	4	81.3	1.3	9.3
How do you rate your ability to recognise the phonetic symbols: (2 x non-respondents)	16	4	54.6	16	5.3
<b>[Third question]</b> Do you think it is important to know the sounds of a language:	1.3	8	5.3	28	56

Pre-test attitudinal comparison question	1 Option %	2 Option %	3 Option %	4 Option %
<b>[Fourth question]</b> Do you use phonetics to help understand how to say new vocabulary: (2 x non-respondents)	13.1	26.6	41.3	16

### Post-test questionnaire:

Question:	-2 Option %	-1 Option %	0 Option %	+1 Option %	+2 Option %
<b>[First question]</b> Did using PHONLAB help you to understand the Phonetic symbols:	2.6	8	16	18.6	50.6

Post-test attitudinal comparison question:	1 Option %	2 Option %	3 Option %	4 Option %
<b>[Second question]</b> Would you use PHONLAB in future to help you understand phonetics:	2.6	20	29.3	42.6

## Analysis: Pre-intermediate.

The following charts list the percentage of the pre-intermediate students that chose each option as recorded by the student questionnaire. The chart reflects the options for each question as they are listed left-to-right on the questionnaire.

### Pre-test questionnaire:

Questions: Sample = 30	-2 Option %	-1 Option %	0 Option %	+1 Option %	+2 Option %
Do you speak English outside the classroom:(1 x non-respondent)	-	23.3	36.6	30	6.6
How do you rate your ability to speak English:(1 x non-respondent)	3.3	10	40	40	-
How do you rate your ability to understand native speakers in conversation:(1 x non-respondent)	6.6	6.6	80	3.3	-
Do you know what the phonetic chart is:(2 x non-respondent)	3.3	10	60	-	20
How do you rate your ability to recognise the phonetic symbols:(2 x non-respondent)	26.6	-	46.6	10	10
<b>[Third question]</b> Do you think it is important to know the sounds of a language:	3.3	10	6.6	26.6	50

Pre-test attitudinal comparison question	1 Option %	2 Option %	3 Option %	4 Option %
<b>[Fourth question]</b> Do you use phonetics to help understand how to say new vocabulary:	16.6	36.6	26.6	13.3

### Post-test questionnaire:

Question:	-2 Option %	-1 Option %	0 Option %	+1 Option %	+2 Option %
<b>[First question]</b> Did using PHONLAB help you to understand the Phonetic symbols:	3.3	6.6	10	6.6	66.6

Post-test attitudinal comparison question:	1 Option %	2 Option %	3 Option %	4 Option %
<b>[Second question]</b> Would you use PHONLAB in future to help you understand phonetics:	3.3	-	40	56.7

## Analysis: Intermediate.

The following charts list the percentage of the intermediate level students that chose each option as recorded by the student questionnaire. The chart reflects the options for each question as they are listed left-to-right on the questionnaire.

### Pre-test questionnaire:

Questions: Sample = 45	-2 Option %	-1 Option %	0 Option %	+1 Option %	+2 Option %
Do you speak English outside the classroom:	-	8.8	22.2	55.5	13.3
How do you rate your ability to speak English:	-	6.6	20	71.1	-
How do you rate your ability to understand native speakers in conversation:	-	2.2	75.5	17.8	-
Do you know what the phonetic chart is:	-	-	95.5	2.2	2.2
How do you rate your ability to recognise the phonetic symbols:	8.8	6.6	62.2	20	2.2
<b>[Third question]</b> Do you think it is important to know the sounds of a language:	-	6.6	4.4	28.8	60

Pre-test attitudinal comparison question	1 Option %	2 Option %	3 Option %	4 Option %
<b>[Fourth question]</b> Do you use phonetics to help understand how to say new vocabulary:	11.1	20	51.1	17.7

### Post-test questionnaire:

Question:	-2 Option %	-1 Option %	0 Option %	+1 Option %	+2 Option %
<b>[First question]</b> Did using PHONLAB help you to understand the Phonetic symbols:	4.4	8.8	20	26.6	40

Post-test attitudinal comparison question:	1 Option %	2 Option %	3 Option %	4 Option %
<b>[Second question]</b> Would you use PHONLAB in future to help you understand phonetics:	2.2	33.3	28.8	33.3

## Analysis: Focus group.

The following charts list the percentage of the focus group students that chose each option as recorded by the student questionnaire. The chart reflects the options for each question as they are listed left-to-right on the questionnaire.

### Pre-test questionnaire:

Questions: Sample = 7	-2 Option %	-1 Option %	0 Option %	+1 Option %	+2 Option %
Do you speak English outside the classroom:	-	-	71.4	28.6	-
How do you rate your ability to speak English:	-	14.3	57.1	28.6	-
How do you rate your ability to understand native speakers in conversation:	-	-	85.7	14.3	-
Do you know what the phonetic chart is:	-	-	85.7	-	14.3
How do you rate your ability to recognise the phonetic symbols:	28.6	-	14.3	57.1	-
<b>[Third question]</b> Do you think it is important to know the sounds of a language:	-	-	-	57.1	42.8

Pre-test attitudinal comparison question	1 Option %	2 Option %	3 Option %	4 Option %
<b>[Fourth question]</b> Do you use phonetics to help understand how to say new vocabulary:	14.2	-	57.2	28.5

### Post-test questionnaire:

Question:	-2 Option %	-1 Option %	0 Option %	+1 Option %	+2 Option %
<b>[First question]</b> Did using PHONLAB help you to understand the Phonetic symbols:	-	-	50	33.3	16.6

Post-test attitudinal comparison question:	1 Option %	2 Option %	3 Option %	4 Option %
<b>[Second question]</b> Would you use PHONLAB in future to help you understand phonetics:	-	-	42.8	57.2

## Analysis: Class #08.

The following charts list the percentage of the intermediate level students that chose each option as recorded by the student questionnaire. The chart reflects the options for each question as they are listed left-to-right on the questionnaire.

### Pre-test questionnaire:

<b>Questions: Sample = 9</b>	<b>-2 Option %</b>	<b>-1 Option %</b>	<b>0 Option %</b>	<b>+1 Option %</b>	<b>+2 Option %</b>
Do you speak English outside the classroom:	-	33.3	11.1	44.4	11.1
How do you rate your ability to speak English:	-	22.2	77.8	-	-
How do you rate your ability to understand native speakers in conversation:(1 x non-respondent)	-	-	77.8	11.1	-
Do you know what the phonetic chart is:	-	-	100	-	-
How do you rate your ability to recognise the phonetic symbols:	-	11.1	77.7	11.1	-
<b>[Third question]</b> Do you think it is important to know the sounds of a language:	-	11.1	11.1	33.3	44.4

<b>Pre-test attitudinal comparison question</b>	<b>1 Option %</b>	<b>2 Option %</b>	<b>3 Option %</b>	<b>4 Option %</b>
<b>[Fourth question]</b> Do you use phonetics to help understand how to say new vocabulary:	22.2	22.2	44.4	11.1

### Post-test questionnaire:

<b>Question:</b>	<b>-2 Option %</b>	<b>-1 Option %</b>	<b>0 Option %</b>	<b>+1 Option %</b>	<b>+2 Option %</b>
<b>[First question]</b> Did using PHONLAB help you to understand the Phonetic symbols:	11.1	-	44.4	44.4	-

<b>Post-test attitudinal comparison question:</b>	<b>1 Option %</b>	<b>2 Option %</b>	<b>3 Option %</b>	<b>4 Option %</b>
<b>[Second question]</b> Would you use PHONLAB in future to help you understand phonetics:	11.1	55.5	33.3	-

## Appendix 3: Teacher questionnaire and analysis.

# phonlab

### TEACHER QUESTIONNAIRE

Please describe any phonetic training you have received:

Please describe any materials that are available to you to help teaching phonetics:

Please describe any technology you use for your teaching:

What level of English do you teach:

Begginer    Elementary    Pre-Intermediate    Intermediate    Upper Intermediate    Advanced

Do you teach phonetics;

Never            Only when students ask me            When they are part of the course ware            I teach phonetics to help students with new vocabulary            I always use a phonetics approach

How do you rate your confidence teaching phonetics;

I don't know what the symbols represent            I am afraid of giving the students the wrong sounds            I feel confident using the lessons in the course ware            I feel that I can help students understand phonetics            I always use a phonetics approach

How important do you rate phonetic teching:

It's not important            It's only important to students that have an interest            It's important, but too difficult to incorporate into the classroom            It's as important as teaching grammar            It's the best way to teach language

Teacher questionnaire page 1.

# phonlab

## TEACHER QUESTIONNAIRE

Do you know what the phonetic chart is:

It's a type of mobile phone	It's a place to find telephone numbers	It's a list of phonetic symbols	It's a game	Don't know
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

How do you rate your ability to recognise the phonetic symbols:

What are phonetic symbols	They look like a funny new language	I know what they are but not how to use them	I am able to recognise a lot of the symbols	I know all the symbols and sounds
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you think it is important to know the sounds of a language:

Not really	a little	Only when learning speech	It's very helpful	The sounds are very important
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you use phonetics to help teach new vocabulary;

Never	only if the student asks me	Yes, but I'm not sure of all of the sounds	Yes
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## POST TEST

Did using PHONLAB help you to understand the Phonetic symbols

What are phonetic symbols	Not really	I didn't understand how to use it	I now know what the symbols mean	Yes, it is very helpful
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Would you use PHONLAB as a supplement to help you when teaching phonetics:

No	Only if it was part of the course	Yes, if students thought it was worthwhile	Yes
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Teacher questionnaire page 2.

## Analysis: Complete teacher sample.

The following charts list the percentage of the complete teacher sample that chose each option as recorded by the teacher questionnaire. The chart reflects the options for each question as they are listed left-to-right on the questionnaire.

### Pre-test questionnaire:

Questions: Sample = 13	-2 Option %	-1 Option %	0 Option %	+1 Option %	+2 Option %
<b>[First teacher question]</b> Do you teach phonetics:	15.3	23	38.4	23	-
<b>[Second teacher question]</b> How do you rate your confidence teaching phonetics:	7.5	23	38.4	30.7	-
<b>[Third teacher question]</b> How important do you rate phonetic teaching:	-	15.5	46.1	30.7	-
Do you know what the phonetic chart is:	-	-	92.3	-	7.6
How do you rate your ability to recognise the phonetic symbols:(1 x non-respondent)	-	15.3	-	76.9	15.3
Do you think it is important to know the sounds of a language:	-	-	15.4	30.7	53.8
<b>Pre-test attitudinal comparison question</b>	<b>1 Option %</b>	<b>2 Option %</b>	<b>3 Option %</b>	<b>4 Option %</b>	
<b>[Fourth teacher question]</b> Do you use phonetics to help teach new vocabulary::	15.5	30.7	30.7	23	

### Post-test questionnaire:

Question:	-2 Option %	-1 Option %	0 Option %	+1 Option %	+2 Option %
<b>[First question]</b> Did using PHONLAB help you to understand the Phonetic symbols: :(4 x non-respondent)	-	-	-	-	69.2
<b>Post-test attitudinal comparison question:</b>	<b>1 Option %</b>	<b>2 Option %</b>	<b>3 Option %</b>	<b>4 Option %</b>	
<b>[Second question]</b> Would you use PHONLAB as a supplement to help you when teaching phonetics:	72.6	-	30.7	61.5	

## Analysis: Teacher with class sample.

The following charts list the percentage of the teacher's that volunteered a class sample that chose each option as recorded by the teacher questionnaire. The chart reflects the options for each question as they are listed left-to-right on the questionnaire.

### Pre-test questionnaire:

Questions: Sample = 7	-2 Option %	-1 Option %	0 Option %	+1 Option %	+2 Option %
<b>[First teacher question]</b> Do you teach phonetics:	-	28.5	28.5	43	-
<b>[Second teacher question]</b> How do you rate your confidence teaching phonetics:	14.2	28.5	14.2	42.8	-
<b>[Third teacher question]</b> How important do you rate phonetic teaching:	-	-	57.1	42.8	-
Do you know what the phonetic chart is:	-	-	100	-	-
How do you rate your ability to recognise the phonetic symbols: (1 x non-respondent)	-	-	-	71.4	14.3
Do you think it is important to know the sounds of a language:	-	-	-	28.5	71.4
<b>Pre-test attitudinal comparison question</b>	<b>1 Option %</b>	<b>2 Option %</b>	<b>3 Option %</b>	<b>4 Option %</b>	
<b>[Fourth teacher question]</b> Do you use phonetics to help teach new vocabulary:	-	14.2	42.8	42.8	

### Post-test questionnaire:

Question:	-2 Option %	-1 Option %	0 Option %	+1 Option %	+2 Option %
<b>[First question]</b> Did using PHONLAB help you to understand the Phonetic symbols: (4 x non-respondent)	-	-	-	-	42.8
<b>Post-test attitudinal comparison question:</b>	<b>1 Option %</b>	<b>2 Option %</b>	<b>3 Option %</b>	<b>4 Option %</b>	
<b>[Second question]</b> Would you use PHONLAB as a supplement to help you when teaching phonetics:	-	-	28.5	71.5	

## Analysis: Teacher without class sample.

The following charts list the percentage of the teacher's that didn't volunteer a class sample that chose each option as recorded by the teacher questionnaire. The chart reflects the options for each question as they are listed left-to-right on the questionnaire.

### Pre-test questionnaire:

Questions: Sample = 6	-2 Option %	-1 Option %	0 Option %	+1 Option %	+2 Option %
<b>[First teacher question]</b> Do you teach phonetics:	33.3	16.6	50	-	-
<b>[Second teacher question]</b> How do you rate your confidence teaching phonetics:	-	16.6	66.6	16.6	-
<b>[Third teacher question]</b> How important do you rate phonetic teaching: (1 x non-respondent)	-	33.3	33.3	16.6	-
Do you know what the phonetic chart is:	-	-	83.3	-	16.7
How do you rate your ability to recognise the phonetic symbols:	-	16.7	-	83.3	-
Do you think it is important to know the sounds of a language:	-	-	33.3	33.3	33.3

Pre-test attitudinal comparison question	1 Option %	2 Option %	3 Option %	4 Option %
<b>[Fourth teacher question]</b> Do you use phonetics to help teach new vocabulary:	33.3	50	16.6	-

### Post-test questionnaire:

Question:	-2 Option %	-1 Option %	0 Option %	+1 Option %	+2 Option %
<b>[First question]</b> Did using PHONLAB help you to understand the Phonetic symbols:	-	-	-	-	100

Post-test attitudinal comparison question:	1 Option %	2 Option %	3 Option %	4 Option %
<b>[Second question]</b> Would you use PHONLAB as a supplement to help you when teaching phonetics:	6.6	-	33.3	50

## **Appendix 4: Teacher observational testimony and class feedback.**

These observations were taken by teachers during the study sessions. The teachers were asked to take note of student engagement, any technical glitches which were disruptive<sup>1</sup> and other interventions or points of interest that arose out of student interactions. The focus group had an initial orientation session which was not observed as it was considered instructional in the use of the equipment rather than the core subject.

Following are the full transcripts of the teachers handwritten observational and class post test feedback testimony;

### **Focus Group teacher questionnaire:**

#### **1. Please describe any phonetic training you have received:**

It was a part of my original training course.

#### **2. Please describe any materials that are available to you to help teaching phonetics:**

Charts, tapes, books.

#### **3. Please describe any technology you use for your teaching:**

cd's, cassettes

### **Focus Group session 1:**

Students became quickly involved in using the phonetics programme.

The layout and controls are very clear and its easy to use. However some students wanted to jump between different parts of the programme. They didn't realise that they had to complete each section before moving on to the next part. So perhaps more or clearer instructions would be better.

While listening and watching the screen the students practised speaking. This did not however distract the other students too much from their task.

There was very little student talking time between students during lesson.

The students thought some of the images of the animals speaking were very funny.

### **Focus Group post session 1 feedback:**

too slow.

more words.

images funny.

2nd program didn't say correct if pronunciation was correct or not.

Better the second time.

Very little stt (student-talking-time).

Some students found it fun.

Too much instruction.

### **Class #02 teacher questionnaire:**

1. as part of ACELS course.
2. Coursebook essentially.
3. I don't use technology - apart from CD or cassettes.

### **Class #02 teacher observations:**

My students enjoyed engaging with the tool. They were interested and motivated to improve and to "Pass" the tests.

The students gave me very positive feedback about the tool and would use it if they were afforded the opportunity. They found it possible to follow the programme and showed interest throughout.

I personally was impressed by it and found the exercise both helpful and enjoyable for every one.

### **Class #03 teacher questionnaire:**

1. Section on phonetics in Grd Dip in TESOL.
2. Phonetic charts + some text book exercises.
3. CD player.

### **Class #03 session observations:**

Tech:

Student 11 - 1min

1 log out - 3 min

Student engagement:

very high - very few questions

everybody worked away on their own and got stuck into the different exercises.

### **Class #04 teacher questionnaire:**

1. Only briefly on my TEFL course.
2. Only whatever is in text books - usually in the back of book!
3. I create radio programmes with younger students. We record them and they take them home on CD. I use Adobe Audition, a sound editing suite I use from home.

### **Class #04 teacher observations:**

The voice of the character needs to be more naturalized, although I know Joe (the researcher) is already aware of that.

We had no technical problems, the programme is easy to use. My only comment would be is that it could be mapped out slightly better - the first page doesn't make it easy to see what you should choose, I mean there's too much choice on the first page.

Playback time for recording not long enough for some exercises.

Overall, once the voice is more naturalized, it's a tool which could be invaluable for students in our school. They used it almost entirely independently from me with no problems, which is empowering for them.

They also liked the feature of changing the opaqueness in order to see the position of the tongue.

### **Class #05 teacher questionnaire:**

1. Self taught.

2. phoneme cards

W/board activities

dictionaries, matching cards.

3. O.H.P.

Cassette/DVD

### **Class #05 teacher observations:**

Does it help you learn pron? start:(14:10)

Questionnaire engaged them well. Your (the researcher) explanation of phonlab was clear & easy to follow.

Short vowel: not a lot of learner repetition. Maybe put in a message saying you must finish and cant start again halfway through.

Some students taking note of symbols. That must be good.

The learner with difficulties in short vowel matching referred back to the chart to revise.

Very engaged students so far. (14:39)

For the analytical student this is very good.

More repetition going on in room now. (14:49)

Some good sound repetition to be heard.

Nobody slamming down the microphone.

I'm not altogether convinced about the accuracy of the voice recognition or is it a case of it's a bit temperamental.

You (the researcher) explained the procedure for the spelling activity well.

### **Class #07 teacher questionnaire:**

1. On TEFL course - reading phonetic symbols

2. Not aware of any.

3. None.

### **Class #07 teacher observations:**

I was not able to observe everything the students did, but I did notice that two students who were initially not paying attention to the instructions were able to work out what to do fairly quickly.

I have one problematic student who is normally apathetic, but she seemed to engage with and enjoy the task.

Students found the voice a bit silly, and perhaps the activities a bit simple. But overall felt it was very useful.

Great idea, pronunciation is v important.

Easy to use, great tool on your own.

The tongue

### **Class #08 teacher observations:**

#### Technical problems

5 restarts to begin

8 restarts during lesson (moving between lessons)

Students needed lots of help setting up (prob because I'm not so familiar with the program), but they got into it after that

Some frustration with exercises loop "you choose played, say played" couldn't stop it – [sic] mic not in front of mouth

Lots of complaints of "it's so boring", "it's too easy", "I know these words"

**Preliminary Coding and Theming of teacher observations:**

<p>quickly involved</p> <p>easy to use</p> <p>clearer instructions</p> <p>practiced speaking</p> <p>engagement</p> <p>motivation self-regulation</p> <p>too slow more words</p> <p>better second time</p> <p>too much instruction</p>	<p><b>Focus Group session 1:</b></p> <p>Students became quickly involved in using the phonetics programme.</p> <p>The layout and controls are very clear and its easy to use. However some students wanted to jump between different parts of the programme. They didn't mphasi that they had to complete each section before moving on to the next part. So perhaps more or clearer instructions would be better.</p> <p>While listening and watching the screen the students [sic] mphasize speaking. This did not however distract the other students too much from their task.</p> <p>There was very little student talking time between students during lesson.</p> <p>The students thought some of the images of the animals speaking were very funny.</p> <p><b>Focus Group post session 1 feedback:</b></p> <p>too slow. More words. Images funny. 2<sup>nd</sup> program didn't say correct if pronunciation was correct or not. Better the second time. Very little stt (student-talking-time). Some students found it fun. Too much instruction.</p>	<p>Usage</p> <p>Unclear usage/instruction</p> <p>Core subject mediated</p> <p>No distractions</p> <p>User control</p> <p>Misinterpretation of core subject</p> <p>Improved experience with re-use</p> <p>Less instruction, more interactive</p>
	<p><b>Class #02 teacher observations:</b></p>	

<p>enjoyed engaging interested and motivated to improve</p> <p>possible to follow the programme</p> <p>helpful and enjoyable for every one</p>	<p>My students enjoyed engaging with the tool. They were interested and motivated to improve and to “Pass” the tests.</p> <p>The students gave me very positive feedback about the tool and would use it if they were afforded the opportunity. They found it possible to follow the programme and showed interest throughout.</p> <p>I personally was impressed by it and found the exercise both helpful and enjoyable for every one.</p>	<p>Enjoyment = engagement = motivation</p> <p>Ease of use</p> <p>Engagement</p> <p>Helpful for teacher</p>
<p>technical</p> <p>engagement</p> <p>self-regulation</p>	<p><b>Class #03 session observations:</b></p> <p>Tech:</p> <p>Student 11 – 1min 1 log out – 3 min</p> <p>Student engagement: very high – very few questions everybody worked away on their own and got stuck into the different exercises.</p>	<p>Technical problems</p> <p>Engagement Self-regulation</p>
<p>voice more naturalized</p> <p>technical</p> <p>easy to use</p> <p>too much choice</p>	<p><b>Class #04 teacher observations:</b></p> <p>The voice of the character needs to be more naturalized, although I know Joe (the researcher) is already aware of that.</p> <p>We had no technical problems, the programme is easy to use. My only comment would be is that it could be mapped out slightly better – the first</p>	<p>Technical presentation human v synthetic voice</p> <p>ease of use</p>

<p>technical presentation</p> <p>invaluable tool</p> <p>self-regulation</p> <p>empowerment</p> <p>viseme</p> <p>user control</p>	<p>page doesn't make it easy to see what you should choose, I mean there's <b>too much choice on the first page.</b></p> <p>Playback time for recording not long enough for some exercises.</p> <p>Overall, once the voice is more naturalized, it's a tool which could be invaluable for students in our school. They used it almost entirely independently from me with no problems, which is empowering for them.</p> <p>They also liked the feature of changing the opaqueness in order to see the position of the tongue.</p>	<p>too complex</p> <p>technical improvements to increase interactivity</p> <p>self-regulation</p> <p>motivational</p> <p>user controlled demonstration</p>
<p>clear instructions</p> <p>instruction</p> <p>taking note of symbols</p> <p>referred back to the chart to revise</p> <p>engaged students</p> <p>analytical student</p>	<p><b>Class #05 teacher observations:</b></p> <p>Does it help you learn [sic] pron? StartⓈ14:10)</p> <p>Questionnaire engaged them well. Your (the researcher) <b>explanation of phonlab was clear &amp; easy to follow.</b></p> <p>Short vowel: not a lot of learner repetition. Maybe <b>put in a message saying you must finish and [sic] cant start again halfway through.</b></p> <p>Some <b>students taking note of symbols.</b> That must be good.</p> <p>The learner with difficulties in short vowel matching referred back to the chart to revise.</p> <p>Very <b>engaged students so far.</b> (14:39)</p> <p>For the <b>analytical student this is very</b></p>	<p>Researcher intervention clear</p> <p>Unclear instruction</p> <p>Core subject mediated</p> <p>Self-regulation</p> <p>Engagement</p> <p>Levels of user control</p>

<p>More repetition good sound repetition</p> <p>engagement</p> <p>technical</p> <p>instructions</p>	<p>good.</p> <p>More repetition going on in room now. (14:49)</p> <p>Some good sound repetition to be heard.</p> <p>Nobody slamming down the microphone.</p> <p>I'm not altogether convinced about the accuracy of the voice recognition or is it a case of it's a bit temperamental.</p> <p>You (the researcher) explained the procedure for the spelling activity well.</p>	<p>Action on core subject mediated through tool</p> <p>Accuracy</p> <p>Researcher instruction</p>
<p>work out what to do fairly quickly</p> <p>engage/ enjoy</p> <p>voice silly activities simple</p> <p>important pronunciation</p> <p>ease of use</p> <p>viseme</p>	<p><b>Class #07 teacher observations:</b></p> <p>I was not able to observe everything the students did, but I did notice that two students who were initially not paying attention to the instructions were able to work out what to do fairly quickly.</p> <p>I have one problematic student who is normally apathetic, but she seemed to engage with and enjoy the task.</p> <p>Students found the voice a bit silly, and perhaps the activities a bit simple. But overall felt it was very useful.</p> <p>Great idea, pronunciation is v important.</p> <p>Easy to use, great tool on your own.</p> <p>The <u>tongue</u> (tick)</p>	<p>Ease of use</p> <p>Little instruction necessary</p> <p>User technical ability</p> <p>Engagement/enjoyment</p> <p>Human v synthetic voice</p> <p>Suggestion for improvement</p> <p>Importance of core subject</p> <p>Ease of use</p> <p>User control over demonstration</p>
	<p><b>Class #08 teacher observations:</b></p>	

<p>Technical problems</p> <p>teacher instruction problems</p> <p>frustration</p> <p>complaints/ "I know these words"</p>	<p><u>Technical problems</u></p> <p>5 restarts to begin</p> <p>8 restarts during lesson (moving between lessons)</p> <p>Students needed lots of help setting up (prob because I'm not so familiar with the program), but they got into it after that</p> <p>Some frustration with exercises loop "you choose played, say played" couldn't stop it – mic not in front of mouth</p> <p>Lots of complaints of "it's so boring", "it's too easy", "I know these words"</p>	<p>Without researcher study</p> <p>Set-up</p> <p>Teacher familiarity with tool</p> <p>Technical problems interfering with engagement</p> <p>Misinterpretation of core subject</p>
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**Appendix 5: Academic management questionnaire.**

# phonlab

## ACADEMIC QUESTIONNAIRE

**Please state your position within the school:**

**Please describe any materials that are available to help teaching phonetics:**

**Please describe any technology that is used within the school for teaching purposes:**

**How important do you rate phonetic teaching:**

<b>It's not important</b>	<b>It's only important to students that have an interest</b>	<b>It's important, but too difficult to incorporate into the classroom</b>	<b>It's as important as teaching grammar</b>	<b>It's the best way to teach language</b>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Please describe any problems you are aware of with the teaching of phonetics:**

**Please describe any academic or theoretical practices that the school advocates:**

### **Academic management transcripts.**

The following questionnaire was completed by 3 members of the academic emphasizes, 2 of whom had observed sessions and 1 that evaluated PHONLAB over an individual session.

#### **Academic management #01:**

**1. Please describe any materials that are available to help teaching phonetics:**

Pronunciation In Use

Pronunciation Games

Activities within coursebooks

**2. Please describe any technology that is used within the school for teaching purposes:**

(None indicated)

**3. How important do you rate phonetic teaching:**

It's important, but too difficult to incorporate into the classroom.

**4. Please describe any problems you are aware of with the teaching of phonetics:**

Teachers don't know the phonetic symbols, neither do most learners.

**5. Please describe any academic or theoretical practices that the school advocates:**

Very few – (??)

**6. Please use this space to make any comments you feel appropriate about the use of PHONLAB as an educational resource:**

It is a good programme that fully covers the basic sounds with good learner practice. The 'computer voice' is well done but can't replace a human voice. However, it allows for useful self-study and raises learner autonomy.

#### **Academic management #02:**

**1. Pronunciation In Use, Cambridge University Press (all levels)**

Pronunciation Games, Mark Hanrat

Ship or Sheep

2. CD machines/CD's

Computer room

DVD

3. It's as important as teaching grammar.

4. Insecurity among teachers who are non RP speakers in using phonemic alphabet. Lack of familiarity with phonemic alphabet because not dealt with in sufficient detail on 120 hour courses. Perception that it is dull.

5. Use of any phonetic practice in course books such as English File.

Use of learner dictionaries such as MacMillan so learners can check phonemic transcription. Marking of stress & highlighting of problem phonemes in (??) when boarding. Some drilling esp of suprasegmental features, and especially at lower levels.

6. Students seemed to be very involved, from what I observed. Enjoyed the reward system when they got it right. Students seemed to find it very easy to use and accessible, with minimal teacher interventions. In my opinion, would work very well emphasizes with groups such as Brazilian, work experience students who need remedial practice. Seemed motivating, & only required very basic computer skills.

### **Academic management #03, evaluation only:**

1. Listening exercises / textbooks emphasizes in pron. Eg. Ship or Sheep, Tree or Three, etc.

2. Video, CD player, OHP

3. It's as important as teaching grammar.

4. Making phonetics fun and interesting for students.

Finding alternatives to choral drilling and traditional methodology.

5. School advocates a variety of practices but also emphasizes teacher autonomy in language material usage / pronunciation material.

### Preliminary Coding and Theming of academic management observations:

codes	text	themes
1	<p>Pronunciation Games</p> <p>Activities within coursebooks</p> <p>Pronunciation In Use, Cambridge University Press (all levels)</p> <p>Pronunciation Games, Mark Hanrat</p> <p>Ship or Sheep</p> <p>Listening exercises / textbooks specialised in pron. Tree or Three, etc.</p>	<p>Materials</p> <p>Printed materials</p> <p>Games</p> <p>Minimal pairs</p> <p>listening</p>
2	<p>CD machines/CD's</p> <p>Computer room</p> <p>DVD</p> <p>Video,</p> <p>OHP</p>	<p>Technology</p> <p>Computer room not in use</p>
3	<p>It's important, but too difficult to incorporate into the classroom.</p> <p>It's as important as teaching grammar.x2</p>	<p>Importance of core subject</p>
4	<p>Teachers don't know the phonetic symbols, neither do most learners.</p> <p>Insecurity among teachers who are non RP speakers in using phonemic alphabet. Lack of familiarity with phonemic alphabet because not dealt with in sufficient detail on 120 hour courses. Perception that it is dull.</p> <p>Making phonetics fun and interesting for students.</p> <p>Finding alternatives to choral drilling and traditional methodology.</p>	<p>Problems</p> <p>Teacher and student</p> <p>Lack of training for teachers</p> <p>Perception of being dull</p> <p>Alternatives to choral drill</p>
5	<p>very few</p>	<p>Methodologies in school</p>

	<p>Use of any phonetic practice in course books such as English File.</p> <p>Use of learner dictionaries such as MacMillan so learners can check phonemic transcription. Marking of stress &amp; highlighting of problem phonemes in (??) when boarding. Some drilling esp of suprasegmental features, and especially at lower levels.</p> <p>School advocates a variety of practices but also emphasises teacher autonomy in language material usage / pronunciation material.</p>	<p>Teacher lead methods</p> <p>Teacher autonomy</p>
<p>6</p> <p>good practice</p> <p>'computer voice' well done</p> <p>self-study/learner autonomy</p> <p>very involved</p> <p>reward system</p> <p>very easy to use</p> <p>self-regulation</p> <p>target groups</p> <p>motivation</p> <p>basic computer skills</p>	<p>It is a good programme that fully covers the basic sounds with good learner practice. The 'computer voice' is well done but can't replace a human voice. However, it allows for useful self-study and raises learner autonomy.</p> <p>Students seemed to be very involved, from what I observed. Enjoyed the reward system when they got it right. Students seemed to find it very easy to use and accessible, with minimal teacher interventions. In my opinion, would work very well especially with groups such as Brazilian, work experience students who need remedial practice. seemed motivating, &amp; only required very basic computer skills.</p>	<p>Usefulness</p> <p>Human v synthetic voice</p> <p>Self-regulation</p> <p>Engagement</p> <p>Rewards</p> <p>Motivation</p> <p>Basic computer skills/ease of use</p>