NEW DIRECTIONS IN LEARNING, TEACHING AND ASSESSMENT FOR PHONETICS

MICHAEL ASHBY
UCL (University College London)
m.ashby@ucl.ac.uk

ABSTRACT

This paper gives an account of a series of grant-funded initiatives at UCL over the last four years, developing innovations in the teaching, learning and assessment of phonetics within a university context. The first project set out to investigate the value of computers and other IT equipment (such as wireless microphones) applied within small-group advanced practical training, and demonstrated considerable benefits in flexibility, as well as suggesting new perspectives on the interface between phonetics teaching and research. Next, the PHONLINE project is outlined, which we believe to be the first comprehensive attempt to develop an online distance course making available most of the elements of established on-campus phonetic training within a VLE. This project showed how the interactive online mode of presentation encourages the inclusion of research findings even in a foundation-level syllabus and led to further work, now in progress, aiming to develop opportunities for greater interactivity and particularly to explore the use of further audio tools (such as VoIP), both within and in parallel to the VLE, to achieve this. In a final section, we point out that developments in teaching and learning need to be matched by corresponding innovation in assessment, and report a project concerned with providing a background for the development of meaningful and efficient assessments in phonetics, with a survey of assessment types against a conceptual framework from educational theory.

Keywords: *assessment, e-learning, distance learning, interactivity,VLE.*

RESUMEN

Este trabajo describe una serie de iniciativas de investigación subvencionadas en la UCL durante los últimos cuatro años, para desarrollar innovaciones en la enseñanza, aprendizaje y evaluación de la fonética en un contexto universitario. El primer proyecto se dedicó a la investigación del valor de los ordenadores y otros equipos informáticos (tales como los micrófonos inalámbricos) aplicados mediante formación práctica avanzada a pequeños grupos y demostró considerables ventajas en flexibilidad, además de sugerir nuevas perspectivas en la intersección entre la enseñanza y la investigación de la fonética. El siguiente proyecto descrito, PHONLINE, es, creemos, el primer intento exhaustivo de desarrollar un curso virtual que ofrezca la mayoría de los elementos que se trabajan en la formación presencial en fonética dentro de un VLE. Este proyecto mostró cómo el modo de presentación interactivo fomenta la inclusión de los hallazgos de la investigación incluso en un programa de estudios de nivel básico, y llevó a nuevos trabajos que tienen como objetivo desarrollar oportunidades para una mayor interactividad y, particularmen-

te, explorar el uso de otras herramientas de audio (como el VoIP) para conseguirla, tanto dentro como en paralelo al VLE. En la sección final, indicamos que los desarrollos en la enseñanza y el aprendizaje deben corresponderse con la innovación en la evaluación, y citamos un proyecto que provee un trasfondo para el desarrollo de evaluaciones relevantes y eficientes en fonética, con una encuesta de tipos de evaluación en un marco conceptual proveniente de la teoría educacional.

Palabras clave: *evaluación, aprendizaje virtual, aprendizaje a distancia, interactividad, VLE*

1. INTRODUCTION

1.1. Historical background

As this contribution is concerned with links between phonetics pedagogy and experimental research in phonetics, it may be appropriate to begin with a historical sketch showing that these links – though currently very lively, and assuming new forms – are by no means new at UCL.

UCL was founded in 1826, and just 40 years later, the first Phonetics lectures were given by Alexander Melville Bell. Not only was Bell one of the creators of modern phonetics as we understand it today, but his 1866 UCL lectures on speech were almost certainly the first time phonetics had been taught in a university anywhere in the world. The lectures very probably contained practical or experimental demonstrations, since we know that he made use of an assistant –and that his assistant was his own son, A.Graham Bell, later to be the inventor of the telephone, and at that time a student in the UCL medical school. After a hiatus of about 40 years, during which time phonetics (both descriptive and experimental) was established as an academic and research discipline on the continent, the modern UCL department began in 1907 with the appointment of D. Jones. Though Jones's own early enthusiasm for instrumental and experimental methods declined, the department he built up always allowed them a full place. The first superintendent of the phonetics laboratory was Stephen Jones (no relation to D. Jones), who did pioneering work on X-ray photography of speech. He was succeeeded by D. B. Fry (1907-1983), probably best remembered now as the author of *The Physics of Speech* (1979).

By the time I first joined the UCL department in 1971, it had unrivalled facilities for sound recording and experimental testing, including a pupose-built anechoic

chamber, and had acquired a minicomputer (PDP-12) which from the outset was used for hands-on teaching as well as research. Significantly, the same acoustically-treated complex housed both the experimental testing rooms and the Listening Centre, a teaching facility where students worked with recorded ear-training materials. Over time, as personal sound recording and reproducing equipment became both compact and affordable, the need for a listening facility as a physical installation declined, and the Listening Centre transformed itself into a clearing-house of recorded material relating to speech. It began to disseminate more widely, at nominal charge, materials originally recorded for local use, and some of these, such as «Sounds of the International Phonetic Alphabet» have enjoyed extensive sales over many years, becoming a significant component of the department's worldwide educational outreach.

1.2. Immediate background

The 1990s saw considerable changes in UK universities. Student numbers increased considerably, formal mechanisms for Quality Assurance came to play an increasing role, and funds began to be available, at institutional level and beyond, for teaching and learning innovation guided by educational theory. An early response from UCL, led particularly by Jill House, was the formation in 1994 of NETPhon, a Network for Education and Teaching in Phonetics, supported by funds from the Department for Education and Employment (DfEE). Among the permanent legacies of that initiative is the PHONET mailing list (Teaching of phonetics mailing list), an important channel in the UK for peer exchange and criticism, and for academic and research recruitment. At the time of writing, it has over 300 subscribers and its archives document 10 years of discussion.

Meanwhile, partly in response to growing student numbers, we had developed the Analytic Listening technique (Ashby, Maidment and Abberton, 1996), a way of conducting auditory skill training and assessment modelled to some extent on methods from speech perception experimentation. As the authors commented: *Analytic Listening offers rapid and simple marking and feedback, leads to statistically reliable profiles of students' auditory skills, and reduces the emphasis on symbols and transcription. Because it focuses upon and tests an explicit range of relevant phonetic parameters, it permits auditory-skill benchmarks to be incorporated into syllabus design. At the same time, it encourages a realistic view of the power and limitations of humanly-made phonetic judgements alongside instrumental measurements of speech, which increasingly form a part of classroom training.* (Ashby, Maidment and Abberton, 1996: 1).

NETPhon and the Analytic Listening technique formed the basis for the three-year cross-institutional SIPhTrA project (System for Interactive Phonetic Training and

Assessment) which in 1997 gained support of £148K from the Fund for the Development of Teaching and Learning (FDTL) which had just been established by HEFCE (the Higher Education Funding Council for England) to support projects aimed at stimulating developments in teaching and learning in higher education and to encourage the dissemination of good teaching and learning practice across the higher education sector.

The development and sharing of e-learning tools, already started under NETPhon, entered a new phase. Many of those developed at UCL during the SIPhTrA project remain among the most visited pages of the UCL website, and have also provided a ready-made online infrastructure to support subsequent developments such as the PHONLINE distance learning project. As an example, we can point to SID, the Speech Internet Dictionary created by John Maidment to create a reference source of technical terms used in phonetics; phonology and speech science.

A further legacy of the SIPhTrA project is the biennial Phonetics Teaching and Learning Conference, PTLC, which has grown to become a major international forum. Proceedings of the two most recent conferences are available on the internet (PTLC2005, PTLC2007).

2. COMPUTER AND IT AUGMENTATION OF PRACTICAL PHONETICS TRAINING

2.1. Project outline

This project (2004-2005) was concerned with the practical training of students taking specialized phonetics courses. The present account is based closely on Ashby, Figueroa-Clark, Seo and Yanagisawa (2005).

While the central element in good practice remains small-group interactive teaching sessions in which the students work first with specially constructed materials, and later transcribe and imitate informants who speak a range of languages, we set out to show how the use of computing and IT equipment in the classroom might augment the students' learning experience, and possibly help break down unnecessary divisions between theory and practice. We looked at this from the perspectives of both teacher and learner. In addition, data was gathered from initial evaluations of the approach.

2.2. Teacher's perspective

The practical phonetics teacher's task is to develop materials, deliver them to the class, and manage the interaction so as to foster the students' perception and production skills. The teacher will use live and/or recorded presentation, and require transcription, which will be followed by a gradual revealing or uncovering of answers, and discussion of variants. The animation feature of presentation software such as Microsoft PowerPoint is ideal for delivering pre-prepared material in sections as a class progresses. For further study after each class, a printed handout can be made available at the end, and at the same time an online version goes live.

2.2.1. Feedback

To deal with students' questions, a way is needed of temporarily writing up for consideration the alternative representations which are suggested from the class, ideally on the projected slides themselves. No method of achieving this seems to be in common use. An interactive whiteboard is certainly suitable, but expensive, and at present limited to fixed installations in rooms of small to medium size. A cheap and portable alternative pioneered in the present work is the use of a graphics tablet (a simple and easily portable peripheral) as a device for written input (see figure 1).

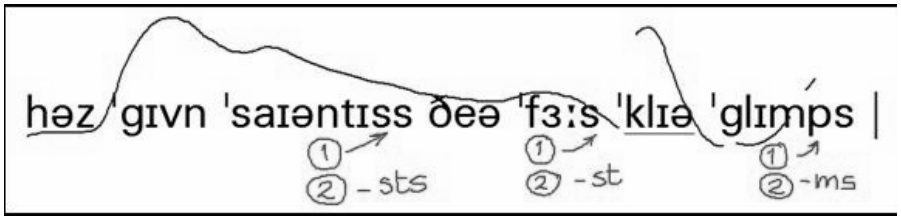

Figure 1. *Transcription of one phrase* has given scientists their first clear glimpse, *from a dictation exercise, as presented on a Power Point slide, with interactive additions typical of those made in the course of an ear-training class.*

2.2.2. Other uses for the classroom computer

The computer, needed for the presentation of teaching materials, can also replace (and comprehensively out-perform) the other items of equipment (audio and video

players) that were formerly needed in the classroom. More significantly, the computer replaces not only the hardware, but the media as well. Where previously the recorded examples relevant to a single teaching session might have been taken to class, there is now no difficulty in having examples for a whole course constantly available, and beyond that, access to databases which can be instantly drawn upon in dealing interactively with students' questions -- for example, the recorded examples for approximately 30 languages which accompany the 'illustrations' in the IPA Handbook (IPA, 1999:39-156).

2.2.3. Live acoustic analysis

The computer can also be used to perform immediate acoustic analysis, using speech analysis software such as wasp/SFS (Huckvale). In an ear-training dictation class, for example, one method is to make a studio recording of the dictation material beforehand. The dictation task then utilises a mixture of pre-recorded and live presentation. As interactive discussion progresses, the exposition is supplemented by acoustic analysis of selected parts of the recording. The necessary portions are quickly accessed via annotations, linked by labels or numbers to points in the script. Figure 2 shows analysis of the phrase transcribed in figure 1.

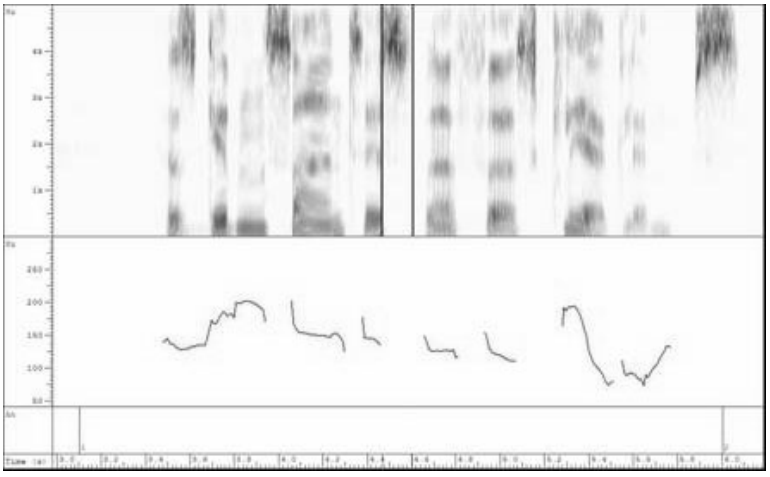

Figure 2. *Typical display from wasp. From top, (i) wideband spectrogram, (ii) fundamental frequency, (iii) annotation points, linked to intonation phrases in the passage*.

In this instance, the measured fundamental frequency agrees well with the impressionistic pitch curve sketched in figure 1, while the uninterrupted frication portion between cursors in the spectrogram corresponds with the end of *scientists* and confirms elision of the [t] in that particular performance of the cluster.

2.2.4. Live analysis in production training

In production training, students' own productions can be analysed live, and the extent to which a student's production matches that of the teacher or native-speaker informant can be objectively analysed by observing the visual displays of recordings (e.g. spectrograms, pitch contours) produced by the software. For example, students can attempt to match VOT patterns, and receive much more specific feedback than is possible with auditory judgements alone. While this has been possible in principle for many years, the use of relatively inexpensive wireless technology in the classroom now makes it feasible for an entire class to share the facility, and for the measurement to be integrated into a regular teaching session. In the approach we are developing, one or more high-quality radio microphones are piped into the computer. The students can thus remain in their places while recording and analysing samples of speech. Other wireless peripherals can assist this interaction. For instance, a Bluetooth or other wireless mouse and keyboard can be used to operate the computer from any part of the room, enabling the teacher to focus on an individual student's needs unobtrusively while the class as a whole is busy.

2.2.5. Benefits of acoustic analysis in the practical class

Bringing the tools of the phonetics laboratory into the practical class has many potential benefits. For example, the unnecessary and damaging division between research and practice is broken down. Second, the practical skills are de-mystified, and their attainment shown as something which can be objectively monitored. Thirdly, the practical sessions become an additional route for understanding the theory and appreciating its applications.

2.3. Students' perspective

2.3.1. Efficiency

Integration of the various teaching tools into a single source, the computer, saves time taken to set up and switch among the various pieces of equipment and helps maintain the attention of the classroom. Not only is content more clearly visible in

PowerPoint than on an OHP transparency, but the lecturer can annotate the transcription in answer to queries from students, and then clear these annotations at the touch of a button to return to an uncluttered presentation.

2.3.2. Bridging the gap between teaching materials and real speech

Using audio or visual equipment to introduce different accents of speech is important in helping students to become aware of the complexities of transcribing real unplanned speech, as compared with transcribing the lecturer's carefully dictated passage. This gives the students an understanding of what transcription work in the field may be like (e.g. in speech therapy, language fieldwork, or forensics), and it also provides opportunities to open up discussions around any discrepancies or irregularities that may arise.

2.3.3. Insight into acoustic-to-auditory mapping

Acoustic analysis software provides valuable assistance in the teaching of transcription. The lecturer can record a passage of speech for transcription and then demonstrate specific points of interest to learners of phonetics, such as pitch movement, or voicing. This technique works best if the lecturer has pre-recorded the passage and identified any points of interest *prior* to the commencement of the class (by annotating the recording), as this ensures that the class is run with a minimum of disruption.

2.3.4. De-mystifiying practical skills

Performing acoustic analysis in practical phonetics classes, and subjecting both students' and lecturer's recordings to immediate measurement and collaborative analysis encourages students to view their productions objectively, promoting self-criticism and improvement. This approach fosters an attitude towards phonetics where judgements about a given articulation are not based solely on auditory perception.

2.3.5. Encouraging independent study with acoustic tools

Finally, demonstration by the lecturer of these tools familiarises students with the tools themselves and some of their uses. The fact that acoustic analysis software is downloadable free of charge acts as an added incentive for students to obtain it and use it in private study.

2.4. Evaluation

An internal grant from UCL's Executive Sub-Committee on Innovations in Learning, Teaching and Assessment (ESCILTA) enabled the ideas outlined above to be tested during 2004-2005, over approximately sixty class hours. A standard evaluation questionnaire at the conclusion of the course, designed to measure satisfaction on a five-point scale, produced a mean score of 4.75, with a range of 4.4 to 5.0. Additional questions (see table 1) specifically addressed the innovations outlined in this paper. The responses to questions 1-6, and 8, are generally very similar, and they are pooled in figure 3. But question 7, specifically designed to encourage the airing of any dissatisfaction or impatience with the technology which had been used in the classes, produced the different pattern of response shown on the right. Only one of 17 respondents supported to any degree the suggestion that the technological devices were sometimes irrelevant or a potential waste of time, and all respondents saw benefits from the innovations.

1	Generally, the use of the computer and other equipment in the practical class improves teaching and learning of phonetic knowledge and skill.
2	The ability to write on and modify slides enables the lecturer to respond clearly and appropriately to questions.
3	It is an advantage to have access to databases of recorded examples of sounds.
4	It is useful to look at acoustic representations (waveforms, spectrograms) when learning new sound types and features in a practical way.
5	It is useful to be able to make live acoustic analyses during a practical class.
6	It is an advantage to have radio microphones, so that members of the class can remain in their places to record examples.
7	There are some types of activity where the technology is irrelevant, or a waste of time.
8	Practical classes in which acoustic analysis is used also help the student to understand phonetic theory and acoustic phonetics.

Table 1. *End-of-course questionnaire items relating to the innovations described in this paper. Respondents registered their agreement or disagreement on a five-point scale.*

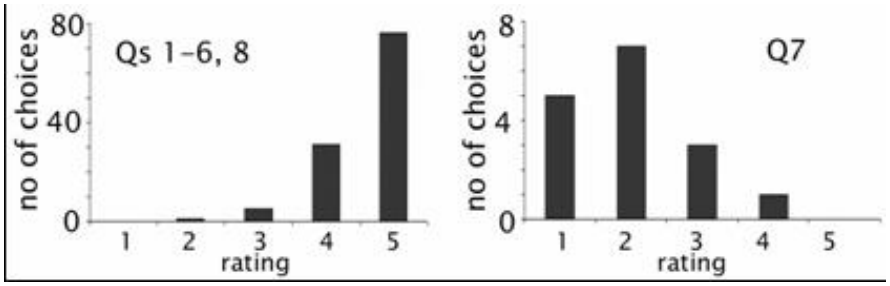

Figure 3. *Pooled ratings (17 respondents) for questionnaire items 1-6 and 8, all of which produced similar responses (left); Responses to item 7 of the questionnaire (right).*

2.5. Project conclusions and further work

The various components of the approach had been tested in a range of teaching environments, and evaluations after one year suggested that the anticipated benefits had been largely achieved. A second ESCILTA grant (2005-6) funded consolidation of this work, and development of a range of training materials for both conventional and web-based publication. It was recognised from the outset that the use of acoustic analysis alone constituted a limitation, and that future work should ideally also incorporate imaging or measurement of speech *production* activity. As a start, funds were also awarded for experiments with a face-tracking video camera, to project a close-up visual image of the speaker to accompany both live presentation and acoustic analysis.

3. THE PHONLINE PROJECT: PHONETICS IN A VIRTUAL LEARNING ENVIRONMENT

3.1. Project outline

The PHONLINE project ran in 2005-2006, funded by a grant of £15K in the first round of Teaching and Research Awards (TRA1) from the Centre for Distance Education (CDE) established by the University of London. The present account is based closely on Ashby, House, Huckvale, Maidment and Yanagisawa (2007a, 2007b).

This project involved the development and evaluation of an online distance course making available most of the elements of established on-campus phonetic training within a Virtual Learning Environment (VLE) – also widely known as a Course Management System (CMS) or Learning Management System (LMS). Issues associated with the use of phonetic symbols in the teaching materials and communication tools of a VLE had to be addressed. We developed an up-to-date, research-driven syllabus for a distance course in English phonetics with associated exercises, ear-training and assessments. An eight-week pilot of the new course attracted 25 students across five continents, indicating a healthy global market for a course of this type. Retention rate to final assessment was 64%; an evaluation questionnaire assessing satisfaction on a five-point scale (1=best) showed an average score of 1.34.

3.2. Rationale and goals

While there had been many previous demonstrations of standalone online learning tools for phonetics, this project aimed to reproduce all the elements of an extended on-campus course, with tutorial material, exercises, practical training and assessment embedded in a VLE/CMS. An advantage of face-to-face phonetic training is that students work collaboratively and learn from each other. A VLE can in principle provide corresponding interactivity for distance learners — but only if it enables users to exchange the appropriate media. Existing VLEs are not well adapted even for the display of phonetic symbols on pre-prepared course pages so that they can be read by all participants regardless of computing platform and browser. The present project included the following goals:

1. to research solutions within a VLE to the specific multimedia needs of distance learning in phonetics

2. to design and implement a distance-learning course in English phonetics

3. to pilot the course and obtain feedback

3.3. Symbols and sounds in the VLE

To maximize interactivity within the VLE, phonetic transcription is needed not only in prepared course materials, and in students' exercises and assessments, but also in spontaneous discussions, in emails – and ideally even in chat forums. The

VLE employed in this project, WebCT, is typical in providing levels of font support and editing capability inadequate for the current application, and differing markedly across its various communication tools. However, institutional support for particular VLEs, and the capabilities of such software, can change rapidly. With a view to eventual transportation of output between VLEs, a general decision was made to adopt Unicode for phonetic symbol display, either in the form of HTML character references or as fonts.

3.3.1. Unicode and HTML

Unicode is the only logical choice for HTML handling of phonetic symbols, and is set to supplant legacy phonetic fonts in other applications too. It offers the prospect of universal compatibility, but has hitherto been cumbersome to use, especially in word-processing applications. For this project a Unicode Phonetic Keyboard was developed for Windows (now distributed from UCL as a free resource), and materials were originated directly in Unicode fonts. At the same time, course pages were produced guiding participants in the installation and use of Unicode fonts for their own written submissions.

With appropriate tutorial guidance, HTML also provides a general solution for participants' use of phonetic symbols within a VLE's Discussions and Mail forums – and freely available internet tools can assist the Unicode character to HTML reference conversion if required (Maidment; Brett). As a fallback, and for Chat forums without HTML support, resort can be had to the all-ASCII system SAMPA.

3.3.2. Audio in the VLE

Trials were carried out to define the protocols for recording format, and sampling rate, and to investigate signal-to-noise requirements, and the value of various types of postprocessing such as noise reduction and normalization. A workflow was established in which reference quality recordings were originated at 44.1 kHz in an anechoic chamber and then normalized and downsampled in batches to give 16 kHz WAV files. A comprehensive system of filenames was evolved, permitting all the textual, graphical and audio resources of the system to be clearly identified. Ample server capacity and student satisfaction with achieved download times made it unnecessary during the pilot to compress audio files, though a range of MP3 options had been evaluated.

3.4. A pilot course: PHONLINE

The developments outlined make possible in principle a broad spectrum of online courses, spanning levels from absolute beginners to research and Continuing Professional Development (CPD) for clinicians. An initial pilot (PHONLINE) was designed as an introductory course in English Phonetics and its aims were defined as:

1. ability to use and produce transcribed material in a specified variety

2. knowledge and understanding of theory sufficient to underpin transcription

3. competence in relevant auditory discrimination skills

3.4.1 Tutorial content and presentation

The design called for interactive course pages, with sound file links throughout, and integration of descriptive and acoustic approaches. Though English is well served with established descriptions (Collins and Mees, 2008; Cruttenden, 2001), no currently available text was entirely appropriate for the requirements of the course. Original material was therefore written in the form of eight units, of which the text runs to 28,000 words. These were converted to HTML, uploaded as draft course pages within the VLE, and systematically assessed and modified for compatibility with a range of browsers on both PC and Macintosh platforms before release. The information accumulated during these trials enabled us to add increasingly specific guidance to the «Getting Started» section of the course dealing with computer and browser settings, and to deal with individual technical problems as they arose.

Reactions from students range from those who found the course pages conventional, and would have preferred audio-visual lectures, to others who chose to print and study the units on paper. (As a backup, units were routinely made available as printable PDF files). The considerable time and resources required for the preparation of multimedia course materials need to be justified by demonstrable pedagogical advantages. We estimate that at least 500 person-hours were devoted to the authoring of the tutorial material. Screenshots of selected course pages appear as figures 4 to 6.

3.4.2. Syllabus

After two units (1, 2) introducing phonetic symbols and transcription, the weekly topics were (3) strong and weak vowels and stress, (4) consonant classification, (5) connected speech phenomena, (6) vowel description, accent differences and change, (7) nasality, aspiration, and coarticulation, with the final unit (8) being a brief introduction to intonation.

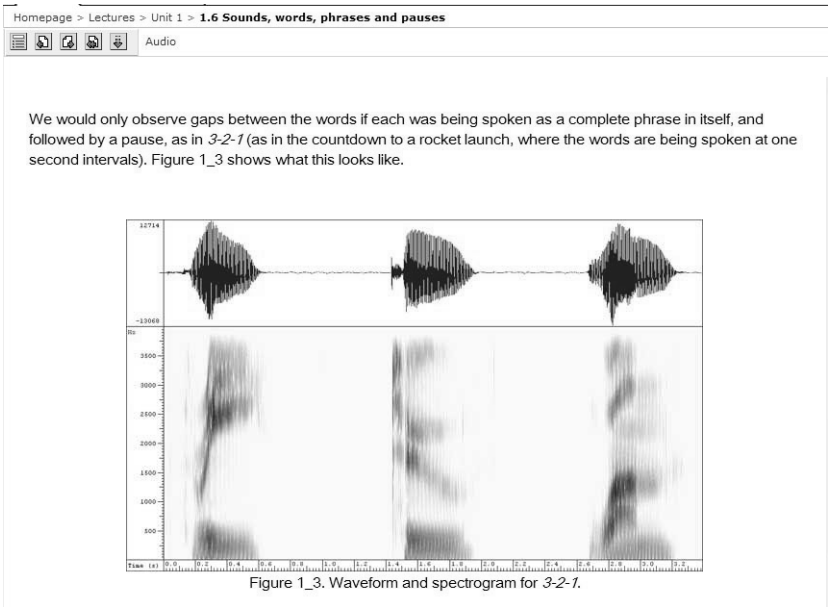

Figure 4. *A screenshot from Unit 1 of PHONLINE. Waveforms and spectrograms are introduced from the beginning. In this instance, the basic concept being illustrated is phrase division.*

3.4.2.1 Research content

By its nature, interactive online presentation encourages the inclusion of research findings. This ranged from simple examples such as newly-noted pronunciations not yet registered in available dictionaries to summaries of recently-completed

studies. For instance, the treatment of vowel change in present-day RP in Unit 6 was able to use formant measurements from a project focusing on female speakers for the first time (Moreiras, 2006; later published as a component of Evans and Moreiras, 2008).

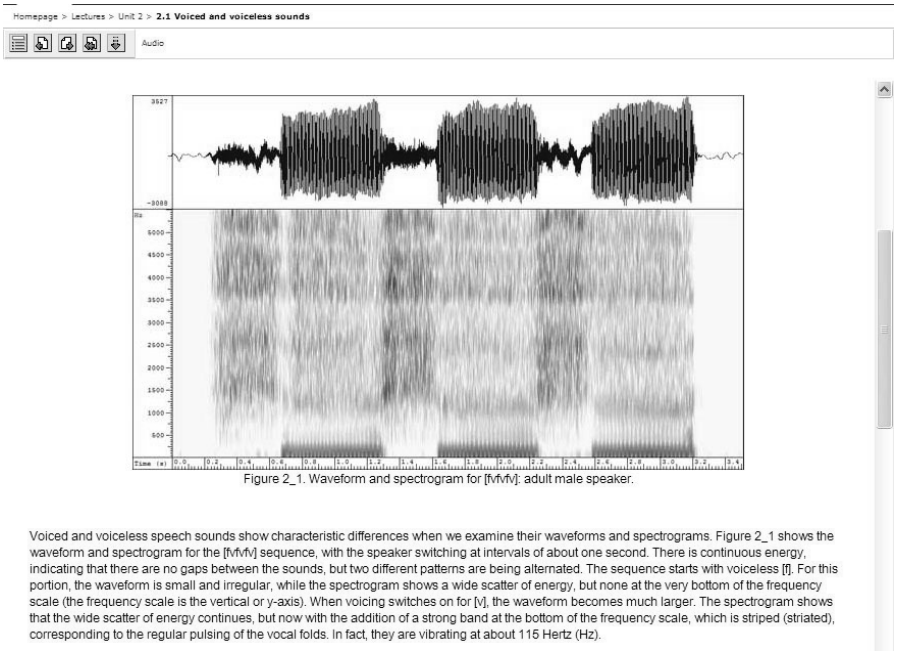

Figure 5. *A screenshot from PHONLINE showing the introduction of the topic of voice and voicelessness.*

3.4.2.2. Descriptive and acoustic approaches

In contrast with familiar textbook accounts, many tutorial topics were introduced or illustrated in acoustic terms, including phrase division and linking, weak forms of function words, aspiration, and vowel quality, and the approach to intonation in Unit 8 was partly inductive, using fundamental frequency measurements on a recorded passage introduced for other purposes at the outset of the course. The traditional separation of acoustic and descriptive articulatory approaches is

challenged by the ready availability of acoustic analysis tools (Boersma and Weenik; Huckvale), which participants were encouraged to install and use alongside this course. An indication of success came as early as week 2, when a student posting referred to spectrographic analysis applied to a problematic ear-training item. An advantage of retaining the WAV format for our own recordings was to simplify the routing of audio to such tools.

3.5. Exercises

It was in developing the exercises that the greatest obstacles were encountered from the limited functionality offered by the VLE. JavaScript was used to augment the repertoire of possible tasks, enabling such features as drag-and-drop and diagram building exercises, as well as immediate feedback in the course of a task. An example screenshot is given as figure 6. All exercises were tested and progressively modified in an effort to make them run within the VLE regardless of the browser or computer platform in use.

3.5.1. Ear-training

Each batch of exercises concludes with ear-training practice, which presents recorded material which must be transcribed. Both connected English speech and nonsense materials were provided in each unit. Separate from the program of eight units, and providing a learning resource in its own right, a virtual Listening Centre provided a library of recorded and transcribed material which was constantly available for reference and practice. A virtual resource thus replaced for online students the physical resource referred to above (Introduction, 1.1).

3.5.2. Promoting interaction and discussion

In general, answers to exercises could be revealed as soon as students were ready; no attempt was made at automatic scoring of complex ear-training material. Increasingly as the course progressed, answers and instructors' comments for selected exercises were withheld for a time and students encouraged to exchange solutions in the Discussions forum. This almost always operated asynchronously, as participants were spread across the globe in different time zones; on the other hand, delays were not great, since all were progressing through the course on the same weekly schedule.

3.6. Assessment

Each unit included an assignment to be submitted for grading. Submission took the form of a Word document or PDF, and made use of the VLE's standard provisions for uploading and logging assignments. Unsurprisingly, the grading and feedback process proved challenging and time-consuming. A two-tier system of detailed feedback was evolved, in which general feedback relevant to all students was supplemented by individual explanations targeted at each participant. Once issued, the general feedback was kept available as a resource within the assignments area of the course.

The final assessment took the form of a one-hour multiple-choice test (a practice test was also provided), accompanied by a transcription-from-audio task (without specific time limit) of the type that had been utilised throughout.

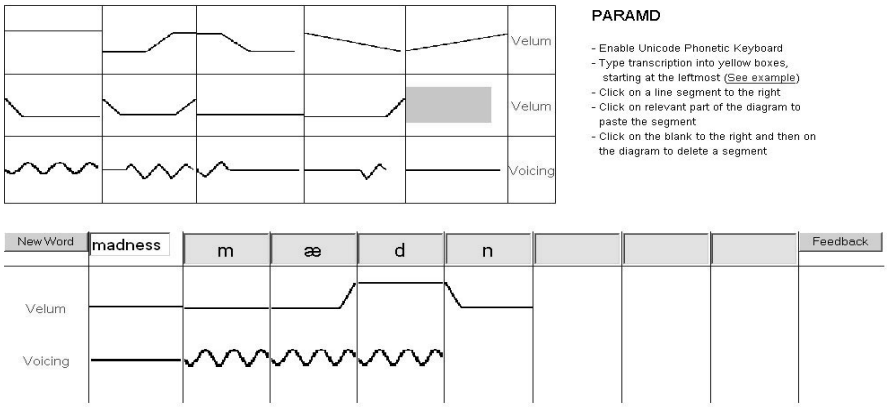

Figure 6. *Screenshot of a PHONLINE exercise in which parametric representations of articulatory activity in specified words and phrases are assembled by drag-and-drop of supplied pattern-pieces.*

3.7. Recruitment and admissions

All recruitment and admissions took place online, following announcement on an institutional website and postings to a small number of relevant mailing lists. It was

no doubt an inducement that participation in the pilot was without charge, but the scale of response was surprising. Within twelve days of the initial announcement, 147 applications had been received from 40 countries (figure 7). In terms of phonetic knowledge, 31 applicants classified themselves as advanced learners of phonetics, 96 as having basic knowledge and 20 as having no prior knowledge. An admissions procedure was established to deal with the unexpectedly large number of applications. Twenty five students were admitted, and a waiting list established.

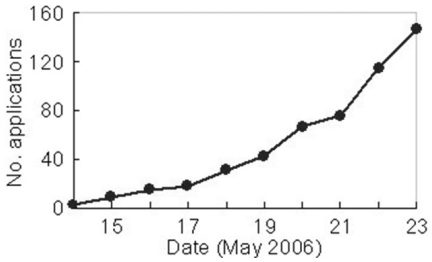

Figure 7. *Cumulative application numbers.*

3.8 Workload and retention rate

All 25 participants were successful in logging into the course at least once, and 24 became regular users. Students could log on at their convenience but were expected to spend at least 2 to 3 hours online every week. Results from the evaluation questionnaire confirm that this was a realistic estimate, with the greatest number reporting 2.5 to 5 hours of online study per week (figure 8).

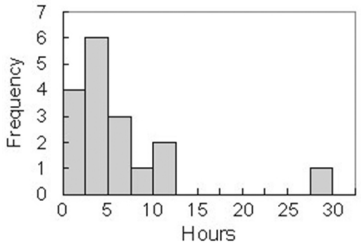

Figure 8. *Study hours per week (self reported).*

The number of assignment submissions peaked at 22 for week one. A total of 18 persisted till the last unit and 16 progressed to the final assessment, giving an overall retention rate of 64% (figure 9).

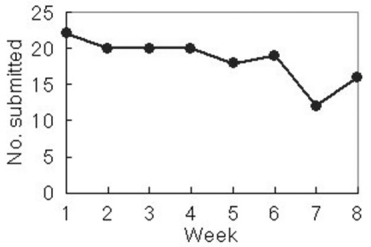

Figure 9. *Number of assignments submitted.*

3.9. Evaluation

An evaluation questionnaire was administered in the final week of the course, and 17 responses were submitted. The questionnaire was designed to include the same core questions as the questionnaire used on campus (see above, 2.4), plus others specific to an online distance course. Fifteen of the 28 questions measured satisfaction with various aspects of the design, organisation and delivery of the course, on a five-point scale, with «1» = «strongly agree». The average score for these questions was 1.34, and the mode = 1, indicating a high degree of overall satisfaction. A large majority of participants reported that they would recommend the course to other students, and that they would undertake further online courses on the basis of their experience with PHONLINE.

3.10. Conclusions and applications

The PHONLINE project demonstrates that with suitable development most of the elements of on-campus introductory phonetic training can already be replicated within a VLE. An appropriate next step will be accreditation of a distance course – perhaps at a level such as that of the IPA Certificate. In 2007, we successfully migrated the techniques to support an established short course (the annual Summer Course in English Phonetics, SCEP) by creating SCEP Online, which ran for a three-month period before, during and after the two-week on-campus course.

3.10.1 Future work

The pilot course demonstrated ear training with a library of pre-recorded materials, and feedback with which participants can compare their transcriptions, but arguably falls short of the spontaneous, improvised and equal interaction of a live phonetics class as described in section 2 of this paper (above). The desirability of greater interactivity was already commented on by participants in the trials, and at more advanced levels interactive exchange among all participants becomes increasingly important.

3.10.1.1 Enhancing interactivity

The success of PHONLINE enabled us to gain a further £20K in the TRA3 round from the same funding body for a project titled «Achieving interactivity in distance learning of phonetic skills» which is still in progress. Among its objectives are:

1. to define and quantify the need for interactive feedback in phonetic skill acquisition

2. to develop, extend and evaluate the full potential for interactivity in our successful VLE-based introductory course PHONLINE

3. to survey and evaluate possible systems for adding parallel functionality to existing VLEs (audio and video tools, VoIP, conferencing, etc) for more advanced courses

4. to demonstrate the feasibility of an advanced field-methods class conducted online, with a language consultant (informant) located in their home environment. This might be termed 'virtual fieldwork.'

4. TOWARDS A TYPOLOGY OF ASSESSMENT

4.1. Project outline

To be fully effective, teaching and learning innovations in phonetics must be matched by corresponding developments in assessment. Indeed it has been claimed

that assessment determines what and how students learn more than the curriculum does. We therefore designed a further project researching the nature of assessment in phonetics, which gained intra-mural finding from ESCILTA and ran in 2007. The present account expands on the outline presented in Ashby and Hirose (2008).

The project surveyed existing assessment types against a conceptual framework from educational theory. An archive of assessment materials, accumulated over approximately 80 years, was digitised as searchable PDFs and catalogued in a database. Recurrent themes in assessment types and content were identified and correlated with current educational thinking. Among the main findings is that phonetics offers interesting instances where high predictability (e.g. of task format) is coupled with completely novel content. This results in efficient, criterion-referenced assessments which can only be approached by deep learning. At the same time, the subject's long-established integration of practical and theoretical content represents an intuitive anticipation by the subject's founders of the value of multisensory activity in fostering understanding and retention. Both the archive of assessments and the database are made freely available to researchers.

4.2. The importance of assessment

Although assessment routinely receives less attention than teaching, experienced teachers recognise well that once students know the form which their assessment will take, even the most highly motivated will in effect «study for the exam», regardless of the learning opportunities provided, or the quality of teaching. As one educational authority puts it: «What and how students learn depends to a major extent on how they think they will be assessed.» (Biggs, 2003:140). In a similar vein, Ramsden (1992:187) writes: «From our students' point of view, assessment always defines the actual curriculum». It follows that the assessment practices of a successful and esteemed teaching institution may repay analytic study quite as much as its teaching methods and materials themselves.

4.3. Archive of assessment materials

Phonetics has been taught and examined at UCL for a century, on a range of academic programmes, and at a variety of levels spanning introductory to postgraduate research. This had left a disregarded legacy of assessment materials (examination question papers, oral examination materials, etc) which potentially charts the history of teaching in the subject just as clearly as do generations of lecture notes or the succession of textbooks. For this project, we were able to

assemble and digitize 230 items stretching back to 1929. We employed a FUJITSU SCANSNAP scanner and associated proprietary software, producing fully searchable PDF files even from originals which are faded, damaged, or unevenly typewritten. This digital archive is in itself a significant output from the project; copies (approximately 20 MB) are available on request.

4.4. Database

The next step was the creation, using Microsoft Access, of a searchable database to facilitate reference. Items were classified according to their date, the academic programme which they served (for example, the MA Phonetics, the Diploma of Licentiateship of the College of Speech Therapists, etc), and their type (written examination, oral examination, etc). Certain aspects of the internal structure of question papers are also represented; in particular, there is a long tradition for including a practical transcription task as one of the choices within a paper otherwise consisting of «essay» type questions, and this was made apparent by including a sub-category «Style of assessment» (see figure 10). Copies of the database (approximately 1.5 MB) are available on request to interested researchers.

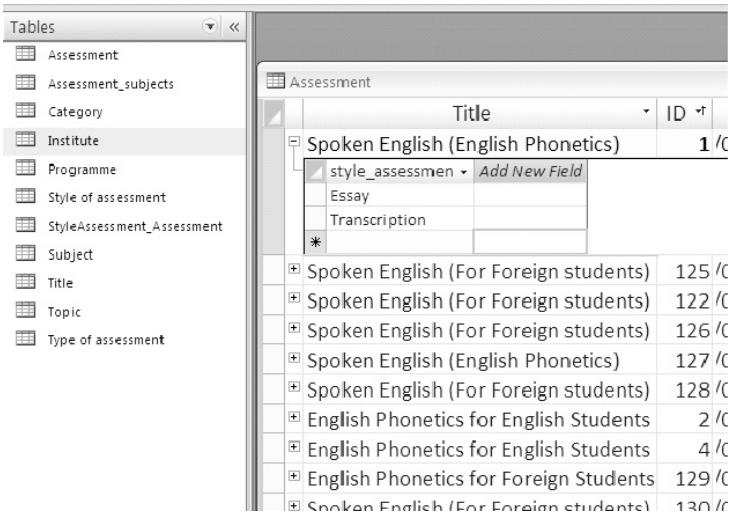

Figure 10. *Magnified portion of a screenshot showing the database in use.*

4.5. Educational themes

4.5.1. Theoretical background

A bibliography of around 30 key references on assessment was assembled and examined by way of background. For current purposes the educational orientation adopted is well represented by the influential text of Biggs (2003). This prompts reflection in terms of «deep» and «surface» approaches to learning. Among others, the following have been suggested as factors in the teaching environment which tend to promote a deep approach to learning (Biggs, 2003:16-17):

1. Teaching in such a way as to explicitly bring out the structure of the topic or subject

2. Teaching to elicit an active response from students, e.g. questioning, presenting problems, rather than teaching to expound information

3. Teaching by building on what students already know

4. Confronting and eradicating students' misconceptions

5. Assessing for structure rather than for independent facts

Evidently, we may look for these factors in assessment, in teaching materials, or in teaching methods. But granted the assumptions outlined in section 4.2, to the extent that these factors are present in assessment, they are likely to pervade the whole teaching and learning environment, and thus have an impact on the quality of learning.

4.5.2. Project findings

Overall, our survey of established assessment methods prompted us to conclude:

1. Phonetics offers interesting examples of assessment types where high predictability (eg of task format) is coupled with completely novel content. This results in compact, efficient and objectively-markable

assessments which can only be approached by deep learning. A good example is the making of phonetic transcriptions, whether from orthographic text (see 4.4 above) or from an audible stimulus (see sections 2.2; 3.5.1 above).

2. The subject's long-established integration of practical and theoretical content represents an intuitive anticipation of the value of multisensory activity now promoted as a learning activity that fosters understanding and retention. A good example is the phonetics practical (oral) examination, and the type of preparatory class which this entails (see sections 2.2.4; 2.3.4 above)

4.6. Conclusions

We conclude that certain long-established practices in phonetics assessment within the London School accord surprisingly well with recommendations derived from modern educational thinking. This may, of course, be partly fortuitous; but it may also result from inspired insight on the part of the founders of the discipline and department (see section 1.1 above). This finding helps vindicate the approach, described in section 2 above, in which acoustic methods in phonetics are used to augment (rather than completely replace) conventional practical training, and to justify the attempt (see section 3 above) to emulate the elements and methods of a conventional phonetic training within a VLE (rather than simply put phonetic content into the default structures of the VLE itself).

Taken together, the pedagogical initiatives outlined here hopefully point towards a rapprochement between descriptive and experimental approaches in phonetics, even in foundation-level teaching, and also suggest that modern technology can help us both to preserve and make more widely available than ever before the inspired teaching insights of the past.

ACKNOWLEDGEMENTS: The work described in this paper was made possible by two Teaching and Research Awards (2005-2006 and 2007-2008) from the Centre for Distance Education, University of London, and by grants 2004-2005, 2005-2006, 2006-2007 from Escilta (Executive Subcommittee for Innovations in Teaching, Learning and Assessment, UCL).

5. REFERENCES

ASHBY, M. and A. HIROSE (2008): «Deep and surface learning in phonetics: perspectives from a survey of assessment», paper presented at *BAAP*, Sheffield, March-April 2008.

ASHBY, M.; J. HOUSE.; M. HUCKVALE; J. MAIDMENT and K. YANAGISAWA (2007a): «A distance e-learning course in phonetics», *Proceedings of the XVI International Congress of Phonetic Sciences*, Saarbrueken, pp. 1713-1716.

ASHBY, M.; J. HOUSE; M. HUCKVALE; J. MAIDMENT and K. YANAGISAWA (2007b): «Phonetics in a virtual learning environment», *Proceedings of the Phonetics Teaching and Learning Conference (PTLC2005)*, London, UCL.

ASHBY, M. G.; J. A. MAIDMENT and E. R. M. ABBERTON (1996): «Analytic listening: a new approach to ear-training». *Speech, Hearing and Language* (UCL), 9, pp, 1-10.

BIGGS, J. (2003): *Teaching for quality learning at university*, Maidenhead, Society for Research into Higher Education and Open University Press, second edition.

BOERSMA, P. and D. WEENIK: «Praat».
12-02-07: http://www.praat.org

BRETT, D: «Unicode Phonemic Typewriter».
12-02-07: http://davidbrett.uniss.it/phonemicTypewriter/ phonemicTypewriter.html

COLLINS, B. and I. MEES (2008): *Practical phonetics and phonology: a resource book for students*, London, Routledge, second edition.

CRUTTENDEN, A. (2001): *Gimson's Pronunciation of English*, London, Arnold, sixth edition.

EVANS, B. and C. MOREIRAS (2008): «Variation and change in RP monophthongal vowels: a comparison of male and female speakers», Poster presented at *BAAP*, Sheffield, March-April 2008.

FRY, D. B.(1979): *The Physics of Speech*, Cambridge, Cambridge University Press.

HUCKVALE, M: «SFS Speech Filing System».
12-02-07: http://www.phon.ucl.ac.uk/resource/sfs/

IPA (1999): *Handbook of the international phonetic association*, Cambridge, Cambridge University Press.

MAIDMENT, J: «juki – ipa phonetic unicode keyboard».
12-02-07: http://www.phon.ucl.ac.uk/home/johnm/juki/jukix.htm visited

MOREIRAS, C. (2006): *An acoustic study of vowel change in female adult speakers of RP*, unpublished BSc project dissertation, UCL.

NETPhon: 30-05-08: http://www.phon.ucl.ac.uk/home/netphon/Welcome.html.

PHONET: 30-05-08: http://www.jiscmail.ac.uk/lists/phonet.html.

RAMSDEN, P. (1992): *Learning to teach in higher education*, London, Routledge.

SAMPA. «SAMPA computer readable phonetic alphabet».
12-02-07: http://www.phon.ucl.ac.uk/home/sampa/index.html.