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ABSTRACT

In the areas of audiology and speech science, computer technology has moved to the forefront in both the clinical and laboratory settings. It is imperative that students in both speech-language pathology and audiology acquire fundamental skills with all aspects of computer technology in order to maintain professional marketability. A survey of 75 students in the department of communication disorders at Southeast Missouri State University showed that only 9% of the students who completed the questionnaire were very confident about using computer technology, while more than 35% were either somewhat or very apprehensive about it. One of the most frequently cited reasons for infrequent use of computers is lack of training. After viewing the results of the survey, basic competencies and applications in speech-language pathology course work and speech science and audiology course work were developed. Assignments included using e-mail; accessing the Internet for World Wide Web sites appropriate for the course and compiling information obtained from those sources; creating an electronic mailing list; subscribing to listservs and electronic journals; preparing class presentations using PowerPoint or a similar program; using online chat to conduct study sessions; and creating aural rehabilitative materials using online sources. Results of the project have been very positive with respect to student learning. (AEF)

Beginnings: Introducing Computer Technology to Students in Speech-language Pathology and Audiology

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ABSTRACT

In this multimedia presentation, a speech-language pathologist and an audiologist discussed ways of introducing students to technology such as e-mail, World Wide Web searches, computerized speech analyses, listservs, and multimedia equipment. A preliminary survey was devised to given to undergraduate and graduate students in the department of communication disorders; its purpose was to explore students' knowledge of and attitudes to technology prior to the introduction of technology in coursework. Results of this survey and of student outcomes after completion of tasks were discussed.

Presentation April 1, 1996

Overview of Department:

The department of Communication Disorders at Southeast Missouri State University is in the College of Health and Human Services, and offers an undergraduate and a graduate program in speech-language pathology. The graduate program is accredited by the American Association of Speech-Language Pathology and Audiology (ASHA). The department currently has seven full-time and four part-time/adjunct faculty. The student body comprises approximately 70 undergraduate majors and 40 graduate majors. On-campus facilities include a Speech-Language Clinic with a video observation system, an Audiology Clinic with Computerized Audiometric Instrumentation, and a student work area with 4-5 computers (IBM and Apple). While all faculty offices have personal computers, only the departmental main office and two of the faculty offices have modem connection to the university mainframe; networking for all faculty offices is expected to be completed by next semester. Although currently, lab space is very limited, the department does have an extensive array of speech science instrumentation, all PC based. Students have access to a variety of computer labs across campus. In addition, faculty in our college may utilize two computer instructional labs equipped with computer projection systems and Internet access.

In Spring 1995 all but one faculty member had #386 computers, and one had a #486 computer; no CD-ROMS were available and there was no mainframe access. Now, all faculty have at least a #486 computer (3 have Pentiums); one faculty member has a Power Mac; two have CD-ROM capabilities; and three have Internet access. In Spring 1995 although all faculty used word processing programs none used the Internet, E-mail, or CD-ROM technology. Five instructional/clinical computer software programs were utilized and one faculty member used computerized speech science instrumentation. Now, a year later, six of the seven faculty members use E-mail and the Internet on a regular basis (including one who has a home page under construction); one faculty member has developed a Phonics Instructional CD-ROM; two faculty have begun utilizing computerized presentations in classrooms; more than forty instructional and clinical software programs are now available and used in the department; and all faculty members are routinely using computerized speech science instrumentation.

Competencies for Speech-Language Pathologists and Audiologists

Cochran and Bull (1992) outlined competencies for speech-language pathologists that included familiarity with the computer as a diagnostic tool, as a generator of materials, a data recorder and analyzer, a means of access to resources, and as a forum for professional exchange. For audiologists, they discussed in addition the use of computers in hearing aid selection and management, cochlear implant configuration, and aural rehabilitation. In the areas of audiology and speech science, computer technology has moved to the forefront in both the clinical and laboratory

settings. It is imperative, then, that students in both speech-language pathology and audiology acquire fundamental skills with all aspects of computer technology in order to maintain professional marketability. In both the speech-pathology and the audiology classrooms and clinical laboratories, there are numerous potential avenues to utilize computer technology in an instructional manner. Most notably there has been, in the past two years particularly, a proliferation of internet sites providing excellent resources (both text and graphic) for students to utilize in a self-instructional manner or for the instructors to incorporate in class presentations. A few of the many examples in speech-language pathology are sites dealing with communication disorders specific to certain disorders such as Multiple Sclerosis, Parkinson's Disease, Stuttering, Traumatic Brain Injury, and Down Syndrome. Audiology sites include Sullivan's (1995) Audiology Forum: Video Otoscopy web site and Cheap's (1994) Misc.kids Frequently Asked Questions - Ear Infections and Ear Tubes Web site. In most cases, the sites in both disciplines are well-documented and include appropriate copyrights and disclaimers. Also, most sites are easily accessible via most internet search tools. There is also the potential to provide textbook quality materials via the Web (currently referred to as internet publishing) or to utilize a Web home page for the delivery of course handouts, quizzes, and other communications. Study sessions may also be incorporated via newsgroup postings or even on-line "chat" communication. Audiology classes provide another potential opportunity to integrate computer instruction with the academic curriculum. The proliferation of computer-based audiologic instrumentation and application makes it imperative for the audiology student to develop basic computer knowledge.

In Audiology, the following competencies were proposed initially: the ability to utilize PC-based audiometers for evaluation of hearing; the ability to utilize word processing capabilities for file management and report generating purposes; the ability to utilize electronic mail (E-mail) for professional correspondence; the ability to access the internet and conduct information searches utilizing the World Wide Web, Listservs, Gophers, and Newsgroup sites; and the ability to utilize audiological instructional programs (e.g., computerized audiometric simulations). Additional competencies suggested for more advance students included: the ability to utilize "NOAH-based" office management software and programmable hearing aid applications; and the ability to create computer graphic presentations and aural rehabilitative information files for use in rehabilitative intervention.

In recent years, computer technology has revolutionized the analysis of speech production and speech perception in both research and diagnostic settings. Complete laboratory systems (e.g., the Kay Elemetrics Computerized Speech Laboratory) which allow the transformation and manipulation of numerous parameters of digitized speech samples are now available on large memory personal computers. In most cases, only minimal knowledge of the Windows operating environment and basic typing skills are needed to perform quite complex speech analyses.

In the speech science laboratory, students may be introduced to technology through hand-on speech analysis. Spectrographic analysis, now readily accessible through the personal computer, is an ideal way to supplement the theoretical study of speech production as well as to augment the study of phonetics. Students may be required to conduct analyses of assigned speech samples which demonstrate fundamental differences in place of manner of articulation as well as the influence of phonetic context and prosodic elements on the acoustic speech signal. It may also be useful to require students to review samples of the abundant literature available in the area of spectrographic analysis. Students may also be encouraged to conduct their own replicative or pilot analyses utilizing the spectrographic analysis capabilities of the person technology, has opened a new arena of therapeutic options for the speech-language pathologist. Special application programs, such as the Kay Elemetrics Sonamatch option, also provide unique rehabilitative visual display which evolved from earlier spectrographic features of speech. Students may be encouraged to apply spectrographic analyses in the clinic environment with their own clients.

A related area of speech analysis which has also been recently enhanced through computer technology is voice analysis (e.g., the Kay Elemetrics Nasometer Analysis Program, the Kay Elemetrics Visipitch, the Kay Elemetrics Nasometer, and the Kay elemetrics Aerophone II). Computer-based programs are available to measure nearly every aspect of voice production from the respiratory system, to laryngeal vibration, to articulatory structural movements. No longer should the speech-language pathologist rely solely on a trained ear to subjectively document pathological or normalizing changes in voice production. Students should be aware of the considerable controversy regarding which measures are most appropriate for voice behavior documentation; however, the personal computer allows multiple measures to be taken or calculated simultaneously thereby allowing flexibility in the clinical arena as well as providing an excellent way to compare methods of voice analysis in the investigative arena. Fortunately, all of the voice analysis systems on the market today are generally menu-driven and user-friendly. With minimal introduction to basic computer techniques, students may shift their focus from program operation to program application very quickly.

Perhaps nowhere in the field of Communication Disorders is there a greater discrepancy between students' knowledge of, use of, and attitudes toward computers and the expected competencies than in the area of speech science. The competencies identified by Brown and Kester (1993) which are particularly appropriate for speech science students include: the ability to use MS-DOS commands and the MS-Windows interface; the ability to use a program with the documentation provided; and, the ability to manage files on hard disk. Additional advanced competencies include: the ability to create, sort, and query a database; and, the ability to create charts, graphs, and flow charts.

In recent years, instrumentation in the speech science laboratory has been

increasingly computerized. Originally, instrumentation was manufactured and marketed in bulky hardware units. Now instrumentation is, for the most part, software designed and incorporated into the personal computer. This has facilitated the integration of various instruments into one unit as well as increased student access to the instrumentation. While students express considerable apprehension about the instrumentation associated with speech science as well as computer use in general, the user-friendly design of most instruments makes orientation to the use and application of the instrumentation less time consuming.

Technology Goal

One of the goals developed for this academic year by the Information Technology Committee for the College of Health and Human Services at Southeast Missouri State University was to assess the training needs of all faculty and students and to provide opportunities for those needs to be met. An assessment instrument was developed by Julia Wommack, a graduate student in Communication Disorders, to gather information about current status of competency of students. We wanted an instrument that would assess students' attitudes towards computers, their training experience, the kinds of computers and programs with which they were familiar, and their familiarity with and use of e-mail and the Internet. After a pilot study this instrument was revised to its present form (see Appendix A) and distributed to 75 students in the department of communication disorders.

Survey

Results of this preliminary survey showed that of the 75 students who completed the questionnaire, only 9% were very confident about using computer technology, while more than 35% were either somewhat or very apprehensive about it. While 60% had used or were using word processors, only 36% owned a computer (most often an IBM). 63% of the students had taken a required computer course in college and had been introduced to the use of e-mail; however, only 14% used e-mail regularly. More than 59% had never used the Internet; none had used Powerpoint or any other technology program in class presentations.

The most commonly measured concept relating to college students and technology is that of attitude (Moon, 1994; O'Donnell, 1993). Not surprisingly, students with more computer experience expressed more positive attitudes towards technology. One of the most frequently cited reasons for infrequent use of computers is lack of training (Masterson, 1994). Wetzel (1993) discussed the fact that training can be provided either in core computer literacy courses or in an integrated model; we felt that the latter would be the more effective approach to improving student competency.

Where To Begin?

After viewing the results of the survey we listed basic competencies that we wanted to develop in our respective courses in speech-language pathology and audiology. These courses and the applications made in speech-language pathology and audiology classes will now be discussed. Many of these classes took place in the instructional labs on campus.

Applications in Speech-Language Pathology Course Work

The focus of the graduate class in Augmentative and Alternative Communication (AAC) is on individuals with severe communication disorders for whom gestural, speech and/or written communication is temporarily or permanently inadequate to meet all of their communication needs. These individuals need adaptive assistance of various kinds and with varying degrees of technological sophistication; consequently, this course lends itself to technological application and provided a very appropriate venue for additional training. The following tasks were included in the syllabus for this course and marks were assigned for task completion.

Assignments:

- Students must "sign on" and create a message in e-mail.
- Students must access and answer a quiz sent by e-mail, and send it back to the instructor. This ensures that students are able to create, save, and e-mail a document over the network.
- Students must access the Internet to find web sites appropriate for the course being studied. They then bring to class information they have downloaded from that web sites.
- Students must create a mailing list of class-members, and then use it to send information about their class presentations.
- Students must sign on to a list-serve and bring to class some printouts from it.
- Students are invited to prepare class presentations using Powerpoint or a similar program (this was not a compulsory assignment).

Applications in Speech Science and Audiology Course Work

Assignments

- Utilization of e-mail to receive class handouts and assignments.

- Subscription to an audiology-related listserv.
- Subscription to an electronic journal (e.g., Otology Online).
- Compilation of information obtained from an FAQ, Gopher, World Wide Web, and Newsgroup site.
- Utilization of online CHAT to conduct study sessions.
- Creation of aural rehabilitative materials utilizing on-line sources.

To reduce the apprehension of the speech science laboratory, facilitate development of the computer skills in those students who lacked such skills, and to provide students with active learning experiences of key concepts, group labs were conducted initially. Careful selection of groups to include a mix of experienced and non-experienced computer users facilitated these lab experiences. Laboratory groups were assigned an instrument for which they are to read the documentation; learn the process of sampling, analyses, and date storage associated with the instrument; and compose a set of "cookbook" procedures for operating the instrumentation. Following the group lab demonstrations students conducted investigations on their own utilizing the "cookbook" procedures.

Results

Results of this project have been very positive with respect to student learning. Members of the graduate class in speech-language pathology were asked to write anonymously about their assignments, indicating whether they had found them useful and whether their attitudes to technology had changed. Their comments were unanimously positive and indicated increased confidence in use of technology. These are typical examples: "As a result of these assignments I feel capable of using the Internet and e-mail". "I have gained a lot of information related directly to my major. "I used to view computers as not having much personal/professional use to me beyond word processing. How wrong I have been! I learned to use the computer in the context of my field". To date, five graduate students have volunteered to learn, and have successfully used, Powerpoint in class presentations and none had previously been exposed to it.

It was been observed that students who were unfamiliar with Windows-based applications, learned basic Windows functions rapidly by utilizing the speech science instrumentation. Students often reported that they did not know they were utilizing Windows but once they became familiar with the instrument in the group setting, they felt comfortable with other Windows application.

A particular problem encountered with this approach is that the instrumentation is subject to a variety of potential malfunctions. In this regard, when the instrumentation difficulties arise students are expect to follow a three-step process for resolving the problem including: a manufacturer consultation; a university technician consultation; and finally, an evaluation of the problem's effect on the assignment if the first two steps do not yield a solution. This facilitates independent problem-solving abilities in the students and prevents over-dependence on the instructor to solve instrumentation problems. Finally, technology (e.g., frequent software updates, instrument designs, additional application, etc.). Two possible solutions for the instructor in this regard are the creation of challenge groups composed of students who already possess considerable computer experience or utilization of graduate student assistance in the installation and initial set-up of new software or updates.

The greatest difficulty encountered in our experience with these assignments has been gaining adequate student access to computers. It is critical that academic institutions respond to the growing need for computer/internet access. This is particularly problematic in institutions serving rural populations. When incorporating computer assignments in the classrooms, a student should not be penalized for failure to access the computer, provided reasonable attempts have been made by the student. Instructors must facilitate equal opportunity to complete assignments and participate in study sessions, computer simulations, etc.

Finally, problems have been encountered with student documentation of information found on the internet as well as student evaluation of the information. This provides an excellent opportunity for instructors to emphasize and promote critical evaluation of information located via the internet and guidelines are available for citation and referencing of internet information. Also, it is imperative that instructors be somewhat flexible when students report difficulty with computer technology as a reason for late assignments. The instructor's intuition regarding patterns of late assignments as well as the student's attempts to complete assignments should allow an objective decision.

Future

As faculty become more proficient and as our access to technology expands we expect to continue to include technology training within the context of each domain. For example, courses in child language development and disorders might include examples of computerized language analysis and introduction of software used in intervention. We expect to see further and rapid expansion of computer technology in the fields of speech-language pathology and audiology look forward to continuing to explore and promote its use. We feel too that this first essay into the integration of technology with course-work has made us better teachers or rather, co-learners.

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APPENDIX A COMPUTER INVENTORY

Name_____ Class_____

Department_____

Rate your feelings towards computers._____
1.Very Confident 2.Fairly Confident 3.Neutral 4.Somewhat Apprehensive 5.Very Apprehensive

Please give a detailed explanation on your choice. _____

_____

_____

Have you had any training in computers? __None __Some __ A Lot
Was a computer course required by the school you attended? __Yes __No

When and where did you have this training?_____

_____

Mark the type of training __Word Processing __Database
__Spreadsheet __Graphics
__Presentation Software

What types of computers are you familiar with? __IBM __Macintosh __Other

If other, what is the name brand of the computer?_____

Do you own a computer? __Yes __No

If yes, what kind?_____

If no, then where do you type your papers?_____

Do you own a word processor? __Yes __No

If yes, what kind?_____

If no, then where do you type your papers?_____

What types of software programs do you know how to use?
__Microsoft Word __Word Perfect __Windows
__Lotus 123 __Excel __dBase
__Freelance Graphics __CD-ROM __Power Point
__Others (Please List)_____

Have you used E-Mail __Yes __No

Where?_____ and to what extent?_____

_____

Have you used the Internet? __Yes __No Where?_____and to what extent?

_____ _____

Do you feel that there are enough computers available in your department for both faculty and students?__Yes __No

Comments_____

_____

What other types of technology/software would you like to see your department purchase?

_____

_____

_____

Do you feel computer knowledge is important for your career?_____
1. Very Important 2. Somewhat Important 3. Not Important

If you see technology as important, in what ways do you foresee it being used in your future professional life? _____

_____

_____

_____

Please put your E-Mail address here:_____

Other Comments:_____

_____

_____

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