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Readers of DEOSNEWS may be interested in two new publications from
the American Center for the Study of Distance Education:

Video-based Telecommunications in Distance Education. Readings
in Distance Education No. 4. This newest volume of selected
articles from The American Journal of Distance Education
focuses on learners, course design, instruction, and policy
issues related to video-based telecommunications in distance
education.

Internationalism in Distance Education: A Vision for Higher
Education. ACSDE Research Monograph No. 10 (forthcoming in
January, 1995). These revised papers from the International
Distance Education Conference held at the Pennsylvania
State University in June 1994 focus on the practice of teaching
and learning across national borders.

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EDITORIAL

Audiographics is a microcomputer-based hybrid technology that allows
simultaneous transmission of voice communication and graphic images
via local telephone lines. This delivery method is interactive and
gives participants the capability of speaking with each other as well
as sharing text and graphic images. Because of its proven effectiveness,
as well as its low cost when compared to more "high-tech" delivery
systems, audiographics is a good choice for those looking for an
educationally and cost-effective way to deliver instruction.

However, the realization of the potential effectiveness of
audiographics depends on a number of factors. In this month's issue
of DEOSNEWS, Elizabeth Stacey reports on a Deakin University study
that investigated factors necessary for the successful introduction
of audiographic or "telematic" instruction. Interviews and surveys
of practicing teachers, support personnel, and student teachers
studying the provision of languages other than English (LOTE)
indicated that appropriate training and support of teachers is crucial
to developing the positive teacher attitudes which, she suggests,
are necessary for successful distance education programs.

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TEACHING AND LEARNING WITH AUDIOGRAPHICS:
DEVELOPING POSITIVE ATTITUDES AND EFFECTIVE
PEDAGOGY

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BACKGROUND

Educational policy makers in all sectors of education are looking to telecommunications technologies to provide the interaction needed to enhance learning at a distance. This use of technology will only be effective if the teachers and learners who use it do so with positive attitudes and good pedagogy. This paper will investigate the acceptance and implementation of audiographic technology as it was introduced into several project schools in Australia and into tertiary teacher education. Results of research into the attitudes and experiences of teachers and students teachers learning to use this technology will be described. Pedagogical insights developed from the study will be discussed.

The audiographic technology used for distance learning in many states of Australia, often referred to locally as "telematics", is first used to establish an audio link between the locations by speaker phones, or audioconferencing units with microphones and speakers. When more than two locations are linked an audioconferencing bridge is used. Computers, modems and specific audiographic software provide shared interactive computer screens at each location as a visual focus for the lesson, for explaining pictures, diagrams or maps, working out mathematical problems with students, or analysing text together. Graphics tablets and pens can be used, and transfer of full-colour images from a scanner or video camera can be utilised as well as simultaneous access to CD-ROMS and compressed video clips. For immediate document transfer between locations, facsimile machines can be used.

This technology is used widely in Australia to provide students with access to a greater range of curriculum offerings (Stacey, 1994, Gray & O'Grady, 1993). Schools group together in geographically remote but adjacent areas in "clusters" and share teacher expertise. At secondary school level this has provided students with access to classes in a range of curriculum areas previously not always available while elementary schools have particularly made use of audiographics in their provision of languages other than English (LOTE). Other education sectors have also begun to use this combination of audiographic technology (Hill et al., 1991). It is used in some rural community learning centres for adult and community further education as well as in delivery between campuses of some elements of courses in the Technical and Further Education (TAFE) sector. Worldwide use of audiographics is gradually being documented as the technology is improved and is applied to a wider field of education. American studies have shown acceptance of audiographics in multisector use (Fredrickson, 1990) with positive response because of the cost effectiveness, efficiency and flexibility, as well as the motivation and accountability effects on students, which resulted in "improved scores, higher qualitative and quantitative student learning" (p 3). Audiographics is a major element in the New Zealand Tele-Learning Network (NZTLN) and has been successfully piloted

across all sectors as a viable means of educational delivery (Swift, 1993).

DEAKIN UNIVERSITY STUDY

Lecturers from Deakin University, Victoria, worked with a country school cluster of schools grouped for sharing an elementary Indonesian LOTE program and with a metropolitan school with an established exemplary Italian language program, to develop a positive model of telematics introduction. Research into the teachers' attitudes to learning and implementing audiographic technology found a number of important factors necessary for the technology to be introduced most effectively.

The information helped to inform a new Deakin University course unit in telematic teaching introduced by the Faculty of Education into the Curriculum and Methodology course for LOTE teachers in the third year of their course. As well, knowledge of the technology and its effective use was introduced into the education processes and technology coursework within preservice and postgraduate courses. Students who often had little computer experience were introduced to audiographic technology and their attitudes to this experience were also documented and analysed. Effective pedagogy for telematic teaching was defined from a wide forum of documented educational experience (Elliot, 1990, Burge & Roberts, 1993) as well as from the results of this research project. Our experience has shown that with attention to the development of positive attitudes of the teachers involved in the introduction and development of such a technological innovation, good teaching and learning can be enhanced, not sacrificed, in distance education. Introducing such pedagogical learning into a preservice course ensures that teachers will have a better understanding of effective teaching, learning and management strategies as well as the technical competence to teach with this technology.

METHODOLOGY

Elementary LOTE teachers at the schools in the project, as well as supporting classroom teachers, principals and teachers providing technical help, were interviewed and surveyed early in the introductory phase of the program and late in the school year when the programs were well established. Student teachers studying LOTE curriculum and methodology were surveyed before and after their semester-long course. Data were analysed with the qualitative data analysis computer program, NUD*IST (Non-numerical Unstructured Data Indexing, Searching and Theorising; for full description see Richards & Richards, 1994). Using this program, data are categorised under descriptors of concepts occurring most frequently or logically expected to occur in the data. The program develops a tree-like structure for representing relationships between categories of data, and text can be called up relating to any aspect of the emerging patterns and frequent responses within the data.

RESULTS OF STUDY

The factors which emerged as most important in the development of teachers' positive attitudes to using audiographic technology and introducing it successfully, related to the need for support and backup from all school staff, the need for effective professional

development and the need for specific hardware and teaching space to be dedicated to telematic teaching. The benefits of the new technology were welcomed as teachers began to change their curriculum in ways that enhanced their students' learning.

1. Professional Development

The need for teachers to receive sufficient hands-on training with the equipment, as well as learning effective strategies for teaching telematically were seen as high priorities by all teachers in the program, as reflected in these comments:

"Start at the bottom - a thorough understanding of the equipment is essential."

" Access to exemplary examples of telematic programs elsewhere in Victoria would certainly assist in refining a teaching program and defining the future focus."

The more telematically experienced teachers saw that one of the most effective ways of developing confidence in handling the equipment was if expert support was available to help with problems as they arose: "I think if you had an experienced person you can get on to, to show you , to talk through the pitfalls once you've hit it and you can't solve it, that's what you need to do."

The inservice program provided by the Victorian State Ministry of Education Telematics Network, with intensive hands on training in use of the equipment and practice of effective telematic teaching strategies, was seen as a good beginning to learning to teach telematically. Ongoing technical support from the department's telematics officer or from university colleagues was seen as a valuable factor. The university project was seen as an important source of professional development, with student teachers welcomed into the schools to support the program.

2. Whole School Support

Teachers developed negative attitudes to telematic use when they perceived a lack of support from the whole school staff. When space was not dedicated to telematic learning sessions and staff borrowed equipment and didn't return it or leave it reset ready for a telematic lesson, the telematic teaching became stressful. Timetabling had to be agreed on by classroom teachers at all locations so that both teachers and students didn't see the telematic lesson as an intrusion into their program. "Plenty of time free of interruption " was seen as an ideal, coupled with a willingness of the remote school to work cooperatively.

3. Setup of Technology

"Locations which allow effective use of equipment with minimal disruption to classes" was seen as an ideal, as was "a quiet, controlled work space". If space was not sufficient, teachers were frustrated with their attempts to run the program effectively: "Because of the physical setup I can't see how I...could use it with my class...I can't fit more than four kids in the spaces."

Some groups were held in principals' offices and school

staffrooms and this presented problems and interruptions. The need for dedicated equipment which didn't get moved was an important factor for success of the program.

4. Technical Backup

The teachers saw a technical expert as essential to the smooth running of the program:

"A person who is in the technological "know" to smooth out any initial hiccups."

"A consultant who the teacher can go to if there are any problems or questions."

Recurrent phone costs, additional phone lines, and help with setting up were additional organisational issues that teachers needed to address. Situations where teachers were unsupported became stressful.

5. Uncontrollable Events

The need for teachers with flexible attitudes was shown in the catalogue of chaotic events that could affect the use of the telematic technology. The effect of the weather on phone lines, an ant's nest in the junction box and lightning strikes that wrecked computers and shattered the inside of the facsimile machine meant the program was interrupted from reasons beyond the control of the teachers.

6. Curriculum Change

The importance of starting into the program in small groups with well planned "scripted" sessions was a strategy recommended by the teachers. They thought that the introduction of the technology should be curriculum driven but they saw the opportunity for both students and teachers to have access to this technology as a major advantage to the curriculum.

Keyboarding skills became a necessary skill for the telematic technology to work effectively and some schools responded to this:

"..some of the other kids had other kids leaning over them because it took them so long even to find their own name and the school have decided that they would put a keyboarding component into their curriculum which was really good. That's one of the more positive things."

7. Effects on Students

The teachers commented on the children's increasing confidence in using computers for communication and the fact that it was "technology that they quite probably would not see or use first hand for many years," probably not getting access to until at least secondary school. They also saw it giving the children a sense of belonging to a wider community through their telematic links with other schools . The motivation of lessons using a computer meant they "...don't even realise that they are having a lesson. Because they enjoy the telematics sessions they are very interested and willing to participate." There was a general enthusiasm for learning by telematic lessons in the schools where the program was well

established.

Using audiographic technology for children to peer teach other students was a successful strategy that the children enjoyed and which enabled the more able students to practise their language skills:

".. one of the things we've started with the Italian program is the children at A have now learnt to use it, and are teaching some children at B,..peer teaching is a great way to make links and obviously there's a lot of things you've got to teach them about how to do it. But we saw it as one way of getting them to use the equipment in an effective way with practising their language, using the skills they've got."

Some children were uncomfortable with telematic teaching and this may also reflect a gender issue:

".. I've had kids that have been too scared to come because they thought, first of all it was the equipment that upset them, you know what little girls are like, some of them can't even speak on the phone, they spend all their time nodding or shaking their head, but they won't vocalise. And then finding that it was really quite fun, they loved the drawing part....A lot of them just lost any fears they might have had of it."

They found that dominating children have to be monitored carefully so that all children participate confidently. Keyboarding speed was an important element in the program's success, with faster typists experiencing frustration with the slow typists. If the program experienced timetable clashes with other subjects, the children experienced a stress to perform in both curriculum areas and did not want to be involved in the telematic lessons.

The teachers recognised that the children, as they developed skills, could also teach the teachers with the technology:

"I think...one of the best things were the students, because they showed me some things that I hadn't thought about doing and I saw them developing and I could just tell them things that I've learnt that I hadn't realised I'd learnt. ...the mutual theory - where the teacher teaching gets taught in the end themselves."

8. Effects on Teacher Attitudes

Teachers' attitudes to the use of audiographics were very dependent on the factors that have already been discussed. If equipment was problem free and technical support was available, they were more confident about the success of using the technology. If professional development and school support were available as well, they could foresee the positive implications for teaching and learning by this means. Otherwise the frustration levels built up and they weren't as likely to persevere.

Teachers saw hands-on practice as vital and wanted time made available for that learning process with the technology and teaching strategy development:

"Just practice - hands on, hands on. It's the only way. I think we could advance further if we had more preparation time. If we actually had some time where we could sit down and just say "This is my hour, I'm going to play with this equipment and I'd work with D (remote telematics teacher); we're just going to develop what we know and go beyond that."

Peer support from other telematics teachers helped teachers to work through the frustrations of the learning process.

"... if we had someone there to know that it wasn't you, and you stopped getting frustrated and cranky with yourself and thinking I must be stupid if I can't do this, (you know how some people look down on other people if they're not computer literate). You have to know when it doesn't matter how much you push buttons, nothing else is going to happen. "

Once they had progressed through the initial learning stages, they needed models of good student-centred learning to enrich the learning process of this medium.

They decided that teaching this way required an adaptable, flexible teacher who was prepared to change plans if their were technological difficulties.

"Telematics teachers need to process through all stages: confusion, frustration, difficulties, remedies and need to develop adaptability to work around problems that are beyond the teacher's control."

9. Effects on Student Teachers

The student teachers involved in the program who taught their languages from the campus to the remote classrooms also went through a change of attitude toward technology as they developed confidence in its use. They had technical support at all times from the university staff and students were paired in the preparation and delivery of their lessons. This meant that the professional development and support criteria for positive attitudes were met and most students reported positively about their experiences once their initial lack of confidence in computer use was overcome.

They were particularly positive about using the technology as a medium for language teaching as they found that their remote pupils were motivated and enjoyed the variety of the experience: "It's a good way for children to use their LOTE for a purpose. It also helps children practice using their LOTE with their peers." Teachers saw telematics teaching as a delivery with great potential and future and felt that it added to their professional skills and gave them a better chance of gaining a teaching position.

PEDAGOGICAL IMPLICATIONS

A number of studies have identified good strategies for audiographic learning and teaching. Burge and Roberts(1993, p. 78) emphasise the need for careful preparation and rehearsal. They suggest rules for managing talk, developing "an informal protocol or rules for turn taking that allows people to interject easily." MacNamara (p. 39, in Elliot, 1990) suggests that a consistent lesson pattern facilitates the administrative part of the lesson and

suggests teaching in short bursts and with a variety of strategies.

Our study, particularly focusing on elementary age children (8-12 years), developed a number of effective strategies (these have been summarised in the video "Telematics in Teacher Education", Stacey, 1994).

*It was important for the supervising teacher at the remote location to be a partner in the telematics lesson. They were informed of the lesson content and any necessary preparation prior to the lesson. They gave the children the time and opportunity for preparing materials and activities in preparation for the telematic lesson. Often this was material they needed to refer to during the linkup. It would be displayed around the computer or brought to the lesson.

*The environment around the audiographic equipment was important at both ends of the linkup. Charts and pictures were displayed around the students' computers to provide context clues as in face-to-face language lessons. Student teachers referred to labelled photographs of their students at the remote site while teaching the lesson as a way of establishing a real rapport and relationship with the class despite the distance.

*Interactive lessons were essential to replace the usual visual focus of the classroom with an involvement with the computer screen. Lessons were designed to ensure that all children were speaking, drawing, writing and actively listening.

CONCLUSION

If audiographic technology is to provide a cost effective, reliable means of interactive delivery of distance education, it will only be successful if teachers are fully supported and trained so that with positive attitudes to the medium they can develop appropriate teaching and learning strategies for an effective learning environment. This study found that the professional development and support models were key factors in determining whether the teachers developed a positive attitude to the new technology and its implementation. Professional development must be adequate and empowering to the teacher while support, both technical and pedagogical, must be ongoing after the initial training. Equipment and teaching space must be placed for reliable use during the telematics session and the whole school staff must support the importance of the telematics lessons in the school timetable so that optimum conditions are available for student learning.

Introducing telematic teaching into a teacher education course ensures that graduating teachers have a better knowledge of effective teaching, learning and management strategies and a technical competence that will enable them to teach by this method with confidence. This confidence is a result of the development of positive attitudes through supportive training and a sound knowledge and practice of good pedagogy.

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