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PEN-INTERNATIONAL

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>> E. WILLIAM CLYMER: Good morning. I'm the chair of the symposium, and I am here to welcome you this morning. We have a very brief welcome ceremony. We're going to catch up on our schedule, and I'll keep my remarks brief. After Dr. Hurwitz comes out, makes an introduction and a brief welcome remark. So I will be back in a moment.

>> DR. T. ALAN HURWITZ: Good morning, everyone. It's a beautiful day outside. This is the 5th symposium on technology, and it's a wonderful conference. I will make my remarks very brief because I want to be mindful of time. I have the honor of introducing a fine gentleman and a wonderful friend of NTID, our President of Rochester institute of technology, Dr. William Destler. He has been with us for about one year, already one year. He came from the University of Maryland where he was the provost and the senior vice president for academic affairs. His background is in electrical engineering, and in the short time he has been here he has established RIT as a center for innovation and creativity.

Also, about one month ago during our graduation ceremonies, he signed his graduation speech for himself. It was a wonderful opportunity. Please help me warmly welcome Dr. Destler to the stage.

>> PRESIDENT DESTLER: I will not sign this speech.

(Laughter) on behalf of RIT and our community of faculty, staff, and students, I am excited to welcome you to the Rochester institute of technology, where as you know the national technical institute of the deaf is one of the defining units of RIT. I am so pleased that so many of you have come so far to basically engage in an intellectual discourse on the use of technology for instruction for the deaf, and I hope that these discussions are fruitful, and the result of them are the movement towards ever-improved ways of educating this unique and wonderfully gifted population. For all of you who have come so far, I wish you a speedy recovery from jet lag, and an enjoyable visit here in Rochester. I'm told that you will have good weather. I hope that all of you will find this campus a lovely welcoming place. I encourage you at your leisure to get out and walk around and see what this place is made of. But I also hope that you'll take these discussions seriously and that the net beneficiary after all of this, of course, will be the students who will eventually find even better ways to progress in their

own lives through your efforts. So welcome to RIT, and thank you so much for coming.

(Applause)

>> E. WILLIAM CLYMER: I am the chair of the symposium. It's been my honor and privilege to work with people here at RIT, NTID, and all of you that have travelled to be here today. I'm going to keep my remarks very brief so that we can try to catch up on our schedule. But I wanted to share a few important bits of information with you. We have a program of two plenary addresses, the first of which you will see immediately after this welcome. And the second will be Wednesday. Both will occur in this theater. We have 44 formal presentations that will occur in four concurrent rooms. We've provided with you a floor plan so that you can find those locations. We're attempting to use the Internet this time for the symposium to have direct communication with you, to post announcements, and changes related to the symposium.

So please if you can access the Internet. We have provided the NTID learning consortium facility for you. It has 50 computers in there. It's opened the entire time of the symposium. You are welcome to use those computers. And we'll register any laptop that you have on our network so that you can gain the Internet through your own personal technology.

We ask that you provide us with honest and frank feedback to the sessions that you attend. You can do so either on the forms that you will receive at a session, or you can go to the listing on the website and fill out a form electronically.

We hope that you will join us this afternoon for the poster sessions and the exhibits. We have a nice reception planned for you sponsored by PEPNet, and so we'll have from 3:00 to 4:30 for networking, receptions, reception food, and then you can look at the exhibits and the posters.

With that, I would like to turn the welcome remarks over to Dr. Alan Hurwitz. Thank you. I'm sorry, turn the welcome remarks over to James DeCaro.

>> DR. JAMES DeCARO: Good morning. I am Alan Hurwitz.

(Laughter)

This is the fifth symposium of this nature that's been held at national technical institute for the deaf, and Bill has been the chair of all five of those. The first one goes back to 1994 when we were funded by the Department of Education to do a symposium. We had that at the Hyatt downtown, and ever since that time we've had them here out on the RIT campus.

I think that we have an exciting -- pardon me -- an exciting program planned for you, as Bill said 44 concurrent sessions throughout the three days that you will be here.

P.E.N. international, the postsecondary education international is proud to be one of the sponsors of this technology. PEN-International is funded by the Nippon Foundation of Japan. To date we've received close to \$9 million from the Foundation for purposes of helping to improve postsecondary education and in primarily developing countries around the world. As a result, we use this conference as a way to bring together our partners from around the world. So what I would like to do is introduce them to you. I'd like each delegation to stand when I mention their name. Delegation from China, please?

(Applause)

Delegation from Japan?

(Applause)

Russia?

(Applause)

Philippines?

(Applause)

Our two representatives from Thailand.

(Applause)

Our two representatives from Vietnam.

(Applause)

Hong Kong?

(Applause)

Czech Republic?

(Applause)

And last but certainly not least Korea.

(Applause)

(Applause)

Our international colleagues will be doing presentations and also poster sessions, and I encourage you to talk with them, enjoy yourselves and exchange thoughts and ideas. I think that we have much to learn from each other, and you'll also hear a variety of different languages being spoken as well during the presentations. So you can hear some Russian over here, and you can hear some Chinese over there. So they are not just jabbering away and not being attentive. So you will have an opportunity, I hope, to spend some time chatting with them.

As I said, the Nippon Foundation of Japan has been very generous in helping us to support this conference. And it is as a result of their generous support we're able to do this. So I wanted to welcome you. And now I would like to introduce the real Alan Hurwitz.

Alan is very close friend and good colleague. We've known each other for 37 years now. We worked together in a variety of different capacities. Alan is the President of the National Technical Institute for the Deaf, and the RIT vice president and Dean for NTID.

Alan has been the President of the National Association of the Deaf in the United States. He is the former President of the World Jewish Deaf Federation. Alan is also a former member of the World Federation of the Deaf Board. He has been very active in this field since coming to NTID now almost 39 years ago.

Alan's training is as an electrical engineer, and his doctoral degree in education. When Alan did his degrees in engineering, his master's and bachelor's degree, there was no such thing as support services for NTID. So Alan is one of those people who made it through the system before the system was providing access. So my friend and colleague, Alan Hurwitz. Alan?

(Applause)

>> DR. T. ALAN HURWITZ: Thank you, Jim. Hello, again, everyone. My name is James DeCaro.

(Laughter)

I have the wonderful honor of introducing a fine speaker and a fine gentleman. This person I've known, well, all of my life working here at NTID these past 38 years.

This is a man of vision. He has several wonderful quotes that I will always remember. One of his famous quotes is "Failure is not an option. For Deaf and Hard-of-hearing students here at NTID."

There is another area that will always remind us of this gentleman. Flexibility is always a keyword. He also has always said "Dogma has no place here at NTID." He always has made sure that our programs are flexible in such a way that allow Deaf and Hard-of-hearing students to be successful in their education, and then finally in their careers.

The person, of course, with whom I speak is Dr. Robert Frisina. He is professor of the communications science at Rochester Institute of Technology through NTID. He also has a joint appointment with the University of

Rochester medical school. He earned his Ph.D. in audiology and psychology at Northwestern University.

He was the founding director of the Hearing and Speech Center at Gallaudet University, and also serves as the Dean of the graduate students at Gallaudet University.

Dr. Frisina was the founder/director of NTID here at NTID at RIT.

He brought together a team of people in 1967 and built NTID to what it is today.

While Bob was director here at NTID, I remember very well his emphasis on three key skills for young Deaf and Hard-of-hearing people to develop them for the world of work.

The first emphasis was on technological skill, and emphasizing that it was so important to have technical skill so that students could find the right job.

The second was to develop personal and social skills while they were here. They learned how to interact with hearing people so that they would be better prepared for the world of work and to keep jobs that they found.

The third area of emphasis was to develop communication skills in whatever ways that they chose to communicate that would prepare them for employment so that they could advance in their chosen fields.

Those were the three areas of emphasis that Dr. Frisina brought to bear.

Those are still used today.

Currently Dr. Frisina is the director of the International Center on Hearing and Speech Research here at NTID that focuses on aging people who are experiencing hearing loss.

It is a national and international center, and Dr. Frisina is an authority in this field.

He also serves as an adjunct faculty member in the Department of Auto-otolaryngology -- otolaryngology.

At the University of Rochester medical center. Dr. Frisina, I am thrilled to introduce you to this audience today and happy to have you with us to share your perspectives on instruction and access technology within Deaf Education.

Dr. Frisina's topic for today is technology and Deaf Education. The needs and opportunities for technology infusion.

He will speak for about 40 minutes using his PowerPoint and have some quotes from his paper.

Bob, please join me on the stage.

Bob has been my mentor, by the way, and role model for many years.

>> Robert Frisina: They need some time, so in just one minute we'll start, if I don't get tired.

While I'm waiting, let me say that I am very pleased to be here with you. It's been a long time since we started NTID, and I'm very pleased as a person that I had something to do with the beginning of NTID. So I'm proud of all of the people who have contributed to the success of NTID, and its usefulness for all of you from different countries. It's a wonderful thing to be able to experience that, and I thank all of you for coming, and I hope that your experience here is very worthwhile and important for you.

I've prepared my speech so that I would keep the time, and I appreciate and thank you for interpreting, you and Deborah.

I am pleased to be here. In many cases it's like coming home for the long concern of health and general welfare for hard-of-hearing people here in the United States and elsewhere. My introduction to the world of the deaf occurred while an undergraduate student in a Missouri college located in the geographic center of rural America. This fortuitous circumstance took place

when I agreed to assist in athletic programs at the nearby Missouri School for the Deaf.

At that time, direct instruction public residential schools in their growth where approximately 80% of K-12 children were attendance. This is a special time in education, and especially so because of technology available to dramatically influence the learning process.

My purpose today is to share some perspectives on the ever-changing landscape of educating Deaf and Hard-of-hearing students, and in that process stimulate your thinking as to how existing and emerging technologies might accomplish two challenges: First, to quicken the rate of learning, and, second, to enrich the depths of learning at each stage of education.

It is clear that today's coalescence of need and opportunity for creative use of technology has never been stronger. The electronic technology available today far exceed that was the earliest days of NTID and the Nebraska symposium that we used to have on technology.

The abiding problem encountered by Deaf and Hard-of-hearing persons is living in and adapting to acoustically biased societies. The snowballing effects of early onset are well-known. Inability to hear inhibits spontaneous development of speech and language which in turn impacts learning to read and to write.

The one thing that has not changed is the purpose of your work. A constant challenge to educators is overcoming the historic persistent gap in educational progress. And it is in this sphere that innovative auditory and visual sensory technologies hold great promise.

For millions of years we couldn't see atoms, we couldn't hear radio waves, and we couldn't smell TNT. But now thanks to science and modern technology, previously unexplored universes have been opened to us. To such an extent, opportunities and ambitions are in large measure shaped by science and technology. An historic boost to the scope of basic research and technology in this country came about in the year surrounding World War II.

That experience catapulted a reluctant nation into a world leadership role in science and technology. In a mere half-century, an earth spanned connectedness has been established. It is clear from the consent of your symposium that your profession has capitalized on this revolution in science and technology. During this time, much has changed, and yet much remains the same.

The one thing that has not changed is the purpose of your work. However, three changes have occurred and will be the focus of my comments. The first is the system for reaching students has changed.

Second, the characteristics of those who come to serve have changed.

And, third, the educational demands of the workforce have changed.

Reaching them, their characteristics and the workplace, these constitute the big three for any serious conversation about the future.

In examining these, recognize that I have used a personal filtering approach since human enterprises by their very nature are complex. Being deaf or hard-of-hearing can be even more vexing, especially to the uninitiated public at large. One seemingly never-ending challenge is to convey and to have accepted the legitimate learning needs of a group of students at odds with the conventional, acoustically biased approach to learning. And in my experience, this applies at all level of education.

I also suggest a series of unintended consequences that have shaped the current state of the art in your work.

These are revealed in the changing role of education and society, scientific discoveries, demographics, workforce dynamics, telecommunication systems, organization of educational programs, and advances in health that all have conspired to make your lives if not different, at least all the more

interesting as you face the day-to-day needs of a more diversified generation of youngsters.

I think we could all agree that the purpose of your work as educators has not changed. You continue to strengthen the academic, personal, social, and communication preparation of student has will enable them to come self-generated learners, and thereby gain success in the economic mainstream, as well as in the social milieu of their choice.

Additionally, the coin of the realm for those persons that you can concern yourself is, has been, and continues to be literacy. Facility with the language that dominates education and economic participation is paramount.

In the end, it is the general success and well-being of your graduate that matters. Producing independent learners with the skills to move through successive educational levels is easier said than done, especially in a time when the system of education is undergoing what I perceive to be a restructuring, not merely modification.

Hence, all of the uncertainties of ill-defined transition are likely to be present.

I have found that understanding the driving forces responsible for such conditions can be helpful. Just as no man is an island, no profession is an island. What a profession becomes is influenced by factors outside as well as factors from within.

Recognize, first, that external forces are constantly in flux. Consequently, the issue becomes one of how to adapt to such changes. For each profession, the challenge is to determine how these forces actually play out in one's day-to-day realities.

Second, it is also true that the origin and character of macrotrends remain outside the control of any single profession. Therefore, each profession must determine whether such forces can be helpful, neutral, or run contrary to its goals.

And, third, it is also necessary to realize that no single academic discipline can solve all of the problems of your students. This requires that educational system promotes the constructive interaction of all employed in the enterprise. The purpose of which is to create the synergies that lead to quickened rate it's of learning, and educational progress more closely approximated or exceeding that of their hearing peers.

A significant external force affecting all of us has been the changing role of postsecondary education in the United States. A little-known outcome of World War II as the unique challenge of assimilating some 11 million Veterans back into America's economic mainstream.

Thus was born the GI Bill of Rights, a device to help avoid massive unemployment. In the process, however, this signalled a deeper sociologic change. The single Act by Congress set into motion the beginning of universal postsecondary education in this country, one that produced graduate with significant knowledge and skills that, in turn, led the nation into its second Industrial Revolution. Talk about unintended consequences.

You must understand that prior to that generation and with very few exceptions, a high school education satisfactorily met the demands of the workplace. Multi-layered postsecondary education created new research and training opportunities that resulted in a more broadly constituted workforce of Craftsmen, managers, scientists, and engineers.

A place, incidentally, where very few deaf adults Dwelt. Advanced education spawned fundamental scientific discoveries that gave birth to a dazzling array of technologies, many of which have changed the substance and means by which you carry out your work today.

Stage 1 technologies in the modern period that impacted education of deaf and hard-of-hearing students came from the fields of mathematics,

physics, and electrical engineering. This stage was marked by the invention of the transistor and printed circuits that enabled a quantum leap in reliability and miniaturization of electromechanical devices. From this flowed fixed audiometers and precise measurement of hearing, group auditory training devices, wearable ear-level hearing aids and tape recorders. The invention of the scanning electron microscope made visible the anatomy and structure of the inner ear. The operating microscope revolutionized medical practice by advancing middle ear surgery and future cochlear implants. In addition, overhead projectors, xerographic copiers, TV and video recorders, TDD, captioned media, and circumscribed voice recognition systems all examples of stage I innovations.

In stage II, physics, photographic science, and electrical engineering produced a semiconductor microchip. This invention eclipsed electromechanical switches and opened up a whole new era of electronics. Enter digital processing that led to batch, mini, personal computers, handheld calculators, fiber optic cable, Internet, cell phones, portable wireless telecommunication devices, online learning, flat-screen production, smart classrooms, handheld multipurpose computer and telecommunication devices, binaural cochlear implants, C-Print, and the list goes on.

The computer is a good example of how an external development can penetrate and present the profession of a business or organization. In this regard what should not escape us as educators of deaf and hard-of-hearing persons is the momentous change wrought in human machine interface, the alphanumeric keyboard. The auditory-based telephone which for decades placed deaf persons at a serious disadvantage was now co-opted by the audiovisual input and output for Internet communication and e-mail. The establishment of a level playing field in communication.

What we might take for granted today has not always been the case. It has not been long since the question posed regarding auditory training was for whom and for how long? There was considerable skepticism regarding the use of residual hearing in deaf and hard-of-hearing children. Quite remarkable that this question currently is being played out in the form of cochlear implants. Another mid-century development, aural rehabilitation program originally designed for World War II Veterans were developed and served by teachers of the deaf, speech scientists, and hearing scientists. Experienced gain from those rehab programs led to a new field called audiology and speech pathology. Because of their knowledge base, educators of the deaf played a major role in shaping the intersection of these related professions.

Since then audiologists help shape diagnostics, establish neonatal hearing screening, promoted wider use of residual hearing, and promoted earlier and more relevant educational planning.

Another tangential development, mid-way in the past century, virtually all established urban areas had what were called hearing societies, Chicago Hearing Society, San Francisco Hearing Society, Washington, D.C. Hearing Society, and the New York League for the Hard-of-hearing. These organizations served hard-of-hearing adults, a large proportion of who had suffered otosclerosis, a bony growth in the middle ear created a mechanical deterrent to sound reaching the inner ear resulting in a conductive hearing loss. When the binocular operating microscope was invented, it not only transferred the practice of otology, but caused the demise of the historically popular hearing society. A notable exception is the New York League that modified its mission and goals in order to survive. Yet another example of how powers external to one's profession can exert pressure for change neither initiated nor planned for from within. In this regard, not long ago the residential school for the deaf was the center of the educational delivery system for deaf and hard-of-hearing students. There

were a few day schools or classes located in long established large cities, but the vast majority of students were enrolled in residential schools all received direct instruction.

Nearly all teachers, principals, and superintendents were trained at one of four places, Gallaudet, Lexington, Clark, or Central Institute. Less than 1% -- less than 1% of secondary school leaders entered colleges and universities. 99% were enrolled at Gallaudet.

Relatively few K-12 deaf children fell between the cracks. However, the same could not be said for hard-of-hearing children, primarily because they were not diagnosed early and properly.

After falling seriously behind academically, they were often referred to residential schools. Historically a subtle, positive service performed by many residential schools.

Teachers and administrators among schools and programs nationwide compared notes routinely through formal conferences and informal channels. So much so that the education of deaf children until recently could be accurately described as a national educational system.

Nationwide intimacy of that day has given way gradually to a disperse local system largely due to a number of forces outside education. For exam, the rationale for a national highway system begun in the '50s was part of a military strategy that would enable rapid movement of personnel and material.

Unintentionally these new highways also contributed to a population shift from rural to urban. That's where the jobs were.

Simultaneously, universal higher education through the GI Bill created new generations of college graduates who fuelled the manufacturing and service sectors of our economy to unprecedented levels. With that degree in hand, rural hometowns rarely held out appropriate prospects for work. It became evident that a college degree and mobility were highly correlated. The term "extended family" was reintroduced to the daily lexicon, and through the years has become a common place circumstance.

Hence, urbanization and increased educational levels of parents have begun to impact the public policy domain. One unintended consequence we now have a more localized special education approach which in many ways presents you as a profession essentially a non-system marked by considerable fragmentation. A structural shift from direct inclusion to one of access and support services in mainstream settings.

Federal investment in special education, and federal civil rights' legislation during the past century has contributed substantially to the breakup of the residential school as the center of the delivery system. Quite interesting, the analogue in healthcare is to move away from the acute care hospital as the center of healthcare delivery. The point is that any time an organization or industry is forced to restructure, the fallout is far reaching, and that is how I would characterize the present state of our profession, one of restructuring the delivery of services. A condition that offers new opportunities for innovative technology application in the learning process.

Population growth, urbanization, and immigration has combined to produce a diverse set of backgrounds in children who need your services. Socioeconomic status of families determines the potential effectiveness of your efforts. Add living conditions, and you have raised exponentially the level of creativeness to win more than you lose, especially when parents are not active participants in the education of their offsprings.

I can remember attending the White House Conference on Education convened in the early '60s shortly after the surprise appearance of Sputnik which in large measure was a justification for more federal involvement in education. The major concern of that early '60s meeting was the apparent shallowness of the high school curriculum. The worry related primarily to

science and mathematics offerings judged to be inadequate. That is, inadequate to compete in the forthcoming global economy, in essence bringing the college's Liberal Arts curriculum in that period to the high school appeared to be one of the messages.

We see this today in the form of advanced placement courses offered by high school level. Emphasis on stem education for deaf and hard-of-hearing students today is a corollary to those earlier priorities. Another take-home message for me was that a subtle attitudinal shift was taking root across the country. A sociologic shift from one of melting pot mentality to one of a salad bowl. Therefore, diversity and backgrounds that may challenge your daily work today ought not to and surprise. Moreover in my view, social policies adopted soon thereafter suddenly changed the American psyche from one of opportunity to one of entitlement. For whatever reasons, parents who have adopted this attitude only contribute to the indifference often reflected in your student population's motivation for learning and earning.

In my early professional years, Deaf adults had not had the benefit of today's new health-related vaccines and technology. meningitis and other childhood diseases were principal causes of deafness at the time. 30 to 40% of students elsewhere were due to meningitis and high fever. Two consequences were, first, profound deafness, and, second, later aged onset that allowed spontaneous development of speech and language.

In contrast, the maternal rubella epidemic in the '60s resulted in a wave of student whose onset was out birth, and who by comparison presented multiple, developmental conditions. Antibiotics, vaccines, and pre-natal care helped moderate some of the historic causes. However, more recent social, cultural, and demographic changes have resulted in lifestyles that have presented you a mix of consequences, some of which you will recognize at this conference.

In sum, those with whom you deal today are primarily deaf from birth, and many of whom have suffered undiagnosed pre-natal insults often resulting in a variety of behavior and learning problems.

However, it is good to remember that what we have known intuitively a long time ago about brain development has been confirmed empirically. The brain is not hard-wired as once thought, so therefore, and this is important, the use of technology in providing novel sensory inputs can lead to exponential increases in neural connections in the brain, and as a result a more sophisticated capacity to perform.

The character of the nation's workplace is reflected in its principal economic sectors. Early on agricultural dominated the workplace. At the turn of the last century manufacturer took over as the preeminent job producing of our economy. Incidentally, service industries dominate to this day as the so-called information era aided by the relegation of manufacturing offshore. Education and communication demands of the agricultural workplace were quite limited. To participate fully in the manufacturer era required more technical training and facility with the English language. It was the emerging technologies of the '50s and '60s that provided the wake-up call for those concerned with the general welfare of deaf citizens. Deaf adults were slipping dramatically behind their peers in educational opportunities and job accessibility.

For example, tell of the 1965 enabling legislation for NTID, 85% of all deaf adults were in unskilled or semi-skilled occupations. The other 15% were largely Gallaudet graduates who were employed as lino-typists in the government printing office in Washington, or in residential schools of the deaf where they functioned as teachers, athletic coaches, and resident advisors. Rarely did deaf adults occupy technical and manage nearly positions in the private sector.

Recognition that technical skills and English language proficiency were Hallmarks of the modern workforce induced Congress to support the establishment of NTID. It became evident that, "A," for appropriate postsecondary educational opportunities were necessary. "B," that technical skills that added value in the open marketplace were key. "C," that business and industry needed to be educated regarding the capabilities of Deaf employees. And, "D," that the greater public needed to learn that when given a chance to an appropriate education, Deaf people could succeed at levels comparable to their hearing peers.

Considerable progress has been made over the last 40 years. Today there are more Deaf adults holding postsecondary degrees than in their entire history. They are engaged in technical and manage nearly positions in a broader array of jobs than any previous time. But the challenges for the future mount. Job environment characteristics that bear directly on your work will continue. For exam, is little doubt that literacy continues to be a fundamental issue, especially since the computer-based Internet has firmly established and the odds are very high that the standard international language will be English.

How your students think is critical. Thinking in an analytic way how to solve a problem, multi-tasking, and working in teams. Successful thought processing in this information-based social and economic world assumes the capacity to integrate and prioritize multiple sets of information quickly.

Now, as you look to the future, opportunities for technology abound. For example, comprehensive K-12 programs need technologies for organization. Specifically, "A," how to effect an integrated tracking and operational database system within local school districts that makes it possible to move deaf and hard-of-hearing students in a timely manner according to their changing needs as they advance from K-12.

"B," how best to organize regular teachers, support instructional personnel, and classroom arrangements to counteract the fragmentation of effort that has occurred. "C," how to introduce telecommunication technology to engage more parents in the process.

"D," how to foster infusion of access technologies into high school curricula that lead to achievement levels required for entry into postsecondary schools.

And, "E," how virtual networking systems might be employed in bringing together faculty administrators at the local level thus capturing the benefits of an integrated system of education for deaf and hard-of-hearing children.

It is clear that a shift from direct instruction to supported instruction continues regardless of the domain innovative use of communication and instructional technologies hold significant promise for improved educational outcomes.

Greater interaction among teachers, information technologists, and students has been made possible by new digital production and retrieval technology. Access technology that encourages active as opposed to passive learning and simultaneously accommodates the different rates of end-users learning are keys to building improved educational programs.

At the heart of such programs is the ability to expand the learning period beyond the structured time slots and to enable multiple as well as individual uses of the subject-matter content. Infusion rates for new technologies will depend upon educational systems that allow for experimentation and integration of efforts.

Greater control for managing the process exists in the direct instructional model than in the supported instruction system. Guiding the selection and evaluation of instructional technologies by teachers involved

in direct instruction can be a contribution fostered by information technology experts.

The model of supported instruction exemplified in mainstream studies requires the application of technologies to remain to the conventional classroom methods for hearing students. Beyond enabling teachers to adapt to promising applications, here exists the opportunity to assist support personnels and mainstream personnel to experiment, and they, in turn, enable end-users to adapt technology to their personal needs and personal rates of learning.

The NTID experience can be helpful given its well-developed career focus 2 plus 2 associate degree programs where students receive direct instruction and communication from signing professors, NTID classes are generally small allowing for important personal attention, and interaction among students and professors. The classrooms and labs are state of the art, and there are over 200 faculty members with knowledge and experience of the unique educational and communication needs of deaf and hard-of-hearing students.

From its inception NTID has opened new avenues of learning for those attending integrated classes with their hearing peers. From a worldwide perspective, it's admittedly idealized program offers access and support services in RIT's mainstream Baccalaureate degree classes. These students receive access service such as interpreting, realtime captioning, and note-taking, as well as faculty and peer tutoring, academic advising and counselling services. NTID's deep commitment to educational innovation is obvious in its 122 interpreters, 55 C-Print captionist, and some 45 hours of note-taking services offered each academic year. In addition, technology like FM listening devices, captioned media, and the use of interpretype in offices on campus are routine.

A cautionary note on potential outside influences. Your future work might be complicated to some extent by the apparent disconnect between social policy and educational goals of Deaf children and youth, especially for those ill-prepared or not interested in pursuing postsecondary areas of study. Supplemental security -- supplemental security income for disabled and SSDI, the federal social insurance program for disabled workers may very well lure many into dependency from which they will never recover. Public financial assistance may be an incentive, very appealing for those who do not wish to join the ranks of the employed.

And finally an emerging trend in postsecondary education is the push for the Baccalaureate degree, particularly by community colleges across the country. Obviously this relates to what tomorrow's employers will be looking for. "A," the value that one could add to the organization.

"B," certification of skills inherent to a career ladder entry-level position that grows to a lifetime income accumulator.

In educational parlance, an independent learner with lifelong learning interests. Now, during the last half-century the relative value after high school diploma has been replaced with the associate degree. Tomorrow's workplace will see the applied Baccalaureate replacing the associate degree simply because required knowledge and technique will take longer to learn.

The take-home message from all of these realities is success in increasingly dynamic work environments will require high degrees of literacy and personal, social capabilities.

As I bring my comments to a close, I would acknowledge that the production of goods and services during the past century was based principally on research and development in mathematics, physics, and engineering. Radio, TV, computer, satellite communication systems, space travel, and the sequencing of the human genome. The next century will see a continuation for microelectronics to nanotechnology resulting in a

continuation of miniaturization, power, and portability and processing speed. All basic to further development of the Internet enhancement and visual technologies for Deaf and Hard-of-hearing persons.

We can expect technologies geared to improving the matching of technology to the person. Considerable room for improvement exists in the sphere of wearable hearing aids where digital sound processing capabilities will be expanded.

For example, already under way are efforts to utilize artificial intelligence algorithms that will permit data logging and auditory seen analysis. Speech and noise filtering hearing aids have better captured the brainstem advantages of binaural hearing will be accomplished, as will DSP technology that allow the user to train the hearing aid for their profile. And Bluetooth type technology that connects right and left hearing aids, and for wireless connectivity to cell phone, music devices, and computers. Parallel breakthroughs in this sun tree will likely come from biology spurred on by the recent sequencing of the human genome. Look for innovation from cell biology, genetics, and biomedical engineering. Early on in education you are likely to see the results in new tools for teaching and virtual learning environments.

In medicine, breakthroughs are most likely to come through pharmacology applied to noise-induced hearing loss, and chemical changes in the brainstem. Later on we can expect the application of stem cell and gene therapy, the various inner ear components including, for example, interruptions in potassium recycling in the inner ear, and neurotransmitter changes in the feedback system from brainstem to ear. It is safe to say that genetically-determined physical conditions of all types will be viewed as 21st Century targets. Treating cancer and degenerative diseases such as Alzheimer's and Parkinson's are obvious early targets. Treatment of spinal cord injuries should be enhanced through stem cell and cell regeneration research efforts. And then as more is learned about what makes cells live or die, advances in regenerating nerves of all types will follow.

So we will see a coupling of electronically And biologically-based interventions. What might sound impossible today are future realities that will give people personal life choices that heretofore have been out of reach. Now, the enduring hope for improved educational outcomes rests with the creativity of you and your professional colleagues in taking advantage of those technologies that enthuse and guide students to improved capacity for lifelong learning. In spite of the uncertainties that confront us, I am hopeful. So in the spirit, let me close with a thought from Charles Darwin. "It is not the strongest of the species that survives nor the most intelligent, it is the one that is most adaptable to change."

And in order to ensure organizational usefulness in tomorrow's world, change from inside your profession must anticipate influence of macro-forces emanating from outside. Leadership, innovative technologies, and collaboration may well be the order of the new day.

Thank you, and best wishes for a productive and joyful symposium.

(Applause)

>> E. WILLIAM CLYMER: Thank you very much, Bob.

Just a couple of announcements before we move to the concurrent sessions. I wanted to recognize some additional international visitors that we have here today. Josiah from the ministry of Kenya is here. And just this morning two individuals from the ivory coast of Africa arrived, and they are right here.

(Applause)

They are deaf individuals from the Federation of the Deaf.

I also would like to express our appreciation for all of the other international visitors that we have. This gathering today is almost 50% international guests, and we're very pleased to welcome you here today.

(Applause)

One thing that happened this morning is that our campus security force was out writing parking tickets in LBJ parking lot. For those of you without registrations on the windows. We've collected those tickets. They won't be on your car, but if by chance you get a parking ticket, please drop it off at the registration desk and we will clear that for you. So with that, please have a productive meeting, and on to the next sessions. Thank you.

(Applause)

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