

## A Review on Higher Education for Hearing-Impaired Individuals

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Received: April 3, 2015 Accepted: April 20, 2015 Online Published: August 28, 2015

doi:10.5539/ass.v11n24p75

URL: <http://dx.doi.org/10.5539/ass.v11n24p75>

### Abstract

The higher education for the hearing-impaired individuals plays a key role in each nation's education development. Higher education of the deaf learners offers them opportunities to achieve valuable skills and knowledge for employment and social survival equal to the learners with normal hearing. This study aims to investigate on online information and communication technology (ICT) educational courses for the hearing-impaired individuals. ICT education is indispensable for hearing-impaired individuals because the visual display plays a critical role in helping them understand a task. Moreover, supported visual media are frequently used in computer education, because they are more vision-dependent, due to their imperfection of hearing. ICT improves productivity in increasing activity for the hearing-impaired individuals as it empowers them to express themselves through their works.

**Keywords:** Hearing-impaired individuals, Hearing-impaired education, Higher education, Electronic-Learning (E-Learning), ICT (Information Communication and Technology)

### 1. Introduction

The hearing-impaired individuals are those who are not able to perceive sound due to their loss in the sense of hearing. Both receiving and producing spoken language are under the influence of such hearing loss. It is rather common for the hearing-impaired individuals to struggle with spoken and written language. When hearing-impairment occurs in an individual's life, understanding speech acquisitions are poor. Hence, in conversations, miscommunication often arises between the hearing-impaired individuals (Vanderheiden, 1982).

The higher education for the hearing-impaired individuals plays an important role in each nation's education development. Higher education will assist the hearing-impaired individuals to attain the required knowledge and skills for social survival and employment, just like normal-hearing individuals. The hearing-impaired individuals can be defined as the disability for individuals to detect frequencies, or low-amplitude sounds (Vanderheiden, 1982). In 1982, Vanderheiden used another word for this; deaf, where individuals are not able to perceive sound because of their loss in the sense of hearing (Vanderheiden, 1982). For the hearing-impaired individuals, ability of both receiving and producing spoken language is under the influence of the hearing loss. It is rather common for a hearing-impaired individual to struggle with spoken and written language. When a tragedy of hearing-impairment occurs in an individual's life, the understandings of speech acquisitions are poor (Mahshie et al., 1988). Accordingly, the linguistic way of their communication with each other becomes the Sign Language. The learning curve of a new language is definitely not easy. For a normal individual, the language learning is naturally co-operated with the hearing-feedback. However, it is not easy for the hearing-impaired individuals, as they do not have the speech ability. Therefore, the most essential social behavior of a hearing-impaired human being is Sign Language, and it is the most convenient and effectual communication tool.

Communication between the hearing-impaired individuals and the normal-hearing individuals can be very difficult. It is often true that in universities or classes scenarios, the hearing-impaired individuals are often involved in project-oriented groups; thus, miscommunication is normal between them and the normal-hearing individuals (Schull, 2006). Although a number of faculties support students and staff including interpreters who are fluent in both signing and speech, miscommunication still exists; let alone, when the interpreters are rarely

available outside a class. Since video is well-suited for a web-based instruction to collaborate, communicate and information disseminate, subtitles and a translation video picture of the spoken text into sign language could be valuable.

## **2. Hearing-Impaired Children's Communication**

Communication between the hearing-impaired individuals and the normal individuals can be difficult. Higher education of the deaf learners offers them opportunities to achieve valuable skills and knowledge for employment and social survival equal to the learners with normal hearing (Vanderheiden, 1982). English is often a second language of people who are born deaf, with their first language being the Sign Language. If for a normal-hearing child to begin develop expressive speech and language between 1-2 years old, and by the time the child starts school, he has mastered a major portion of the syntactical structures of his native language, and has several thousand vocabulary words. However, for a severe hearing-impairment sustained at an early age, the impact starts upon the education achievement of these hearing-impaired individuals. The only exposure to signing is at school, and language the normal-hearing children use the same way, usually does not them. Without this attraction, hearing-impaired children may miss the critical period for language acquisition. As Huang *et al.* argues, moreover, to achieve an effective stage for developing language-related skills throughout childhood and later in life, then these hearing-impaired individuals must be directly and repeatedly presented with signs, words and language concepts to avoid language development delays (Huang et al., 2008). Parents who get involved early in the process of learning Sign Language can communicate more effectively with their hearing-impaired children and have more impact on the children's progress throughout early life and development (Henderson-Summet et al., 2008). This can facilitate bonding within the family members, in the learning process. However, this is not true for deaf children born to deaf parents, because their language acquisition follows a normal development cycle, which is from the child's birth.

## **3. Existing Education for the Hearing-impaired Individuals**

Education is fairly and equally imperative, for the normal-hearing individuals, or for the hearing-impaired individuals; right from a child's syllabus right through the higher Education. The higher education for the hearing-impaired individuals plays a key role in the development of a nation's higher education. Higher education will assist the hearing-impaired individuals to attain the required knowledge and skills for social survival and employment, just like Normal-Hearing Individuals. Relating to a research on the educational opportunities for the hearing-impaired individuals, Bell and Panko (1977) dealt with the goals around the facets of the hearing-impaired individuals career expansion, research in this procedure and professionals training to work with the hearing-impaired individuals; and meaningful improvement towards these goals were attained (Bell & Panko, 1977). As more of the hearing-impaired individuals enter the typical universities, capable sign-language interpreters with particular knowledge in advanced courses are demanded. Since spoken-language is an obstacle, finding skilled sign-language interpreters and captioners with advanced domain knowledge is rather problematic. Educators who are Hearing-Impaired themselves can better relate to the hearing-impaired individuals, as they do experience the challenges better. Nevertheless, there are also normal-hearing educators who have been familiar to teach these individuals, and serve as mentors to them. Students can benefit better from understanding their needs on the part of educators and, at the same time, from educators' ability to modify their techniques slightly to better adapt with these individuals.

According to Drigas and Kouremenos (2005), although the normal individuals and the hearing-impaired individuals mental abilities are at the same level, however majority of these hearing-impaired individuals today still show worse reading/writing and mathematical abilities (Drigas & Kouremenos, 2005). While some Educational institutions may have accidentally cultivated their education system separately for the hearing-Impaired and the normal students, this does not mean that there are any differences in the content of their studies concepts and syllabus. This is of course depends on the educators, teaching-assistant and academic staff involved in educating them. In education of the hearing-impaired individuals, educators play an important role. Educators are responsible in determining these individuals' needs and satisfaction, since these educators are the ones who know how to educate these individuals. Educators or academic staff have a total control over these individual, because the lessons and studies content for the hearing-impaired are prepared by the educators. Moreover, academic staff will implement some sort of instructional delivery options, in case there is a need for detailed guidelines to support their teaching in student's learning environment.

## **4. Higher Education Courses for the Hearing-impaired Individuals**

Information and communication technology (ICT) education courses are crucial for the hearing-impaired individuals. Sign language is utilized to teach the hearing-Impaired, while voice is used in a normal-teaching

physical class lecture. Supported visual media devices such as graphs, charts and tables are commonly used for computer education, as these individuals are more dependent on vision, because of their shortcoming of hearing. Even in running software, the visual displays play a central role for the hearing-impaired individuals because only the visual displays can support them realize a task.

Sign language is used to teach the hearing-impaired, while voice is used in a normal-teaching physical class lecture. In some cases, interpreters are at the classroom too. Cavender (2007) researched on developing technologies that help managed the academic tasks required by the Hearing-impaired individuals; by testing a classroom platform for these individuals to access inaccessible interpreters and captioners, avoid visual spreading, and simplify interaction in the classroom; and support sharing and capture of instructional materials (Cavender, 2007). All these were possible with wireless networks, data projectors, and portable computing devices; and eventually, a more digital academic environment is created to better go with the needs of students.

Following this research, Cavender et al. (2009) also conducted a research on advancing the deaf and hard of hearing in computing Cavender et al. (2009). To make this possible, Cavender et al. (2009) alleged that a transition programs from high school to college is a critical time for the deaf and hard of hearing students because advance level may require diverse accommodations compared to the previous level. Students must now self-advocate for accommodations, and courses may be faster-paced and less accommodating. Yet, this transition programs are positively correlated with better academic and employment outcomes.

ICT does improve productivity, since it enhances activity for the hearing-impaired individuals. Educational technology has the capacity to comprise the hearing-impaired individuals in the academic mainstream. Not only academically, but job opportunities areas like data entry, graphics animation, computer operations, computer programming, computer technician, software testing and development, web design development and information technology (IT) entrepreneur. ICT has revealed several prospects for these individuals, as the ICT industry proposed a number of jobs.

#### *4.1 ICT Courses for the Hearing-impaired Individuals*

The constant computer technology improvement has made ICT and educational technology become increasingly more imperative in education. Educational research studies reveal that different ways of incorporating computer technology and the context in which computers are used have different impacts on student learning. ICT is divided into the education parts holding up the needs of students at different educational stages.

In appraising students' performance, it is rather possible to present ICT in many ways, such as involve different senses, record and assess learner's choices and performance, and suggest remedial reaction based on the learner's function. The ICT utilization in education provides people having special needs with new opportunities. This support is specifically imperative for students with special needs, in particular, the hearing-impaired individuals. Bell et al. (1977) mentioned the facets of the hearing-impaired students' job improvement, research in this procedure and professionals training to work with hearing-impaired students, in their research on the Educational opportunities for the deaf (Bell et al., 1977).

#### *4.2 Online-Learning Courses for Hearing-impaired Individuals*

Engaging into the online-education environment, the same concept applies for online courses designed for the Hearing-impaired individuals. Using the same online-learning environment, studies reporting investigations of students perspective on online-learning, are more compared to the studies investigating the perspectives of academic staff (Jones & Jones, 2005). This study was also investigated by Palmer and Holt (2009) showing that many educators value the online-learning environment as a method for effectual delivery of learning material to students. Their research shows that students gave higher importance and contentment grades to elements of online-learning, compared to the academic staff; as this environment enhanced their learning (Palmer & Holt, 2009).

More to this research was also supported by various other related works by many researchers (Dutton et al., 2004; Wingard, 2004; Woods et al., 2004; Sharpe et al., 2006; Mahdizadeh et al., 2008) whom indicated that online-learning environment systems efficiently acts as mechanism for accessible delivery of teaching and learning materials to students. With the growth of the World Wide Web as a platform for electronic-learning (E-learning), this makes the web a crucial technology as the accessibility issues in web applications is imperative.

Moreover, most online courses proposed by the educational institutions of higher learning are available to both the normal individuals and the Hearing-impaired individuals. According to Belch (2000), the population for the disabled individuals in college campuses were rising steadily, which simultaneously increased the number of

faculties facing challenging logical accommodations to provide identical access to course materials and instruction to both disabled and enabled students (Belch, 2000); as required by the law in PowerDeFur and Orelove (1997). However, now since computers are accessible broadly as adaptive function developing devices for physically disabled persons (Bowe, 1984; Vanderheiden, 1982), universities environments are being called upon to provide more adaptive computer interfacing facilities for students who need and can benefit from such equipment.

Findings indicate that learning virtually has many benefits over other teaching technologies since it can execute the majority of the learning requirements related to students with disabilities education (Bricken & Byrne, 1993). Therefore, Shayo (2008) argued that the engaging E-learning materials that managed the basic load, and control extrinsic and relevant cognitive load for both disabled and enabled ones should be designed (Shayo, 2008). Moreover, E-learning systems symbolizes a primary means to offer educational services to individuals with disabilities, in particular the hearing-impaired individuals, whom typically have difficulties to attend the physical on-site learning programs, or to gain access to the physical printed learning materials. Furthermore, with E-learning and ICT combination into the web, the skill to intensify interactivity among users allows instructors of large courses to integrate activities into the curriculum; otherwise, it is tremendously problematic due to large enrollments and restrictions imposed by the large lecture hall. Computer-supported collaborative learning is vital, because a group of students can use computers to browse through information on the Internet and to debate, discuss, gather and present information found collaboratively.

This was also critically discussed by Noriah Mohd Ishak et al. (2002) on the use of collaborative computer technology in expanding the traditional college classroom. The research discussed on the new teaching techniques needed for students of higher institution, and the implications of using the collaborative computer technology in college classroom, and how Internet has impacted the individuals. While ICT tools such as chat rooms, e-mail, and forum are useful in helping students interact actively, simultaneously it gives them the opportunity to develop and master their interpersonal and social skills (Mohd Ishak et al., 2002).

#### *4.3 Existing Education Program integrating ICT for Hearing-impaired Individuals*

Although the hearing-impaired individuals operate computers the same way as the normal-hearing individuals, however human interface are important for them. A computer based on the Graphical-User-Interface (GUI) gives no problems for these hearing-impaired individuals, except the failure to hear the sound of the speech synthesizer.

Zawolkow (1980) introduced the Apples program in the schools educating the hearing-impaired youngsters, where programs are served as templates but have no content, since teachers can create and prepare their own lessons for the students (Zawolkow, 1980). With this program installed, the lessons development, and the local program distribution for the Hearing-impaired individuals have eventually become national. Other researchers name Debevc et al. (2007) also conducted a research on the hearing-impaired individuals, and how they were using an available and adjusted E-learning environment for developing their computer mastery (Debevc et al., 2007).

Quite the opposite, if an individual is visually impaired or blind, this gives a drawback for them because the human interface is made by the visual display terminal, the keyboard and the mouse; and most interfaces rely on graphics to display. The content set in graphical images must be provided in an accessible text format, so that by using text-to-speech systems, accessibility is possible. Improving computer systems for visually impaired and hearing-impaired are different because both have different restrictions. Ladner et al. (1987) were concern in how computers are useful to the deaf and blind individuals, and how these individuals can access them; therefore they believed that computer-assisted communication was the answer (Ladner et al., 1987). Hence, they designed DBnet, an incorporated collection of communication applications, which provides an appropriate user-interface for the deaf-blind individuals.

In a scenario taking an example of an individual who is blind and deaf; when two sensory channels (visual and auditory) are used for introducing two information sources, learning is improved, however when one sensory channel is used for introducing two sources of information, learning is harmed. This is studied by Mayer (2001) in the modality effect which is the result of the amount of load put on a sensory channel. In (2001) Mayer stated that if two channels are utilized, each is only burdened with one source of information. But if only one channel is utilized, that channel is burdened with both sources of information (Mayer, 2001).

Baloian et al. (2002) also conducted a research on the modeling educational software for people with disabilities, describing the similarities and differences of modeling the real world for applications tasks with people whom are visually-impaired or hearing-impaired. In their research, they examine two systems; AudioDoom, which let

blind children explore and interact with virtual worlds created using spatial sound, and whisper, which implements a workplace for the hearing-impaired individuals to recognize speech errors, which are showed in a proper way to the learner (Baloian et al., 2002).

Relating to the study of deaf and blind individuals, Jurich and Thomas (2002) stated that ICTs are opening new windows to disable people, as it can supply chances for these individuals to improved access to quality education. They claimed, ICT can be relevant as assistive technology (like the voice recognition for a device, designed for the Blinds); or adaptive technology (like keyboards with colorful keys to attract the Deaf), and as a tool for knowledge and support (Jurich & Thomas, 2002). Even Hayes (1998) suggested that several other websites exist that present information for the disables accessing the Internet; since E-learning has the capacity to move the disable people from the outer edges of educational opportunity to the leading edge of educational innovation (Hayes, 1998).

## 5. Summary

Since E-learning and ICT are rich and complex platforms, they have become the provision of education and training for individuals using virtual learning environments. E-learning produces novel challenges for teaching staff, curriculum support services, disability support services and institutional administrators

A research by Mohd Yasin (2005), on the comparisons of deaf student's achievement in the school examination, stated that the Sign Language used was not fluently signed by the hearing-impaired, thus it is difficult to explain certain abstract words to them (Mohd Hanafi Mohd Yasin, 2005). ICT education contains hearing-impaired individuals to have chances in the industry and research internships, bridge programs between academic levels; mentor and peer support; and career improvement of educators and staff (Burgstahler & Ladner, 2006).

ICT education is crucial for hearing-impaired individuals, because the visual display plays a key role in helping them understand a task. Moreover, supported visual media are commonly utilized in computer education, as they have to depend more on vision, because of their flaw of hearing (Murakami et al., 2002). In conclusion, ICT improves productivity in increasing activity for the hearing-impaired, as it empowers them to express themselves through their works like systems designers, information professionals, software developers, systems analysts, etc.

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