

Learning Technologies for Disabled

Abstract

The hearing impairment is a disability that causes a huge communication gap between hearing impaired disabled and non-hearing impaired people. According to the international statistics of the World Health Organization (WHO), there are 360 million persons in the world with hearing loss (i.e., 5.3% of the world's population), and 32 million of who are children. A number of daily life complications are faced by profound hearing impaired (PHI) individuals due to their communication inability, for example an adverse event. An adverse event is a maltreatment of a patient caused by deceptive communication by the patient or the misunderstanding by a health practitioner. Its reason is mainly attributed to the inability of health practitioners to understand and expresses themselves in sign language (SL). Moreover, sign language is not uniform because it mostly includes informal or natural signs that vary from region to region, which makes it difficult to be understandable globally. Cochlear implantation is another solution to facilitate profound hearing impaired to resolve their communication inability. However this solution is very expensive and cannot affordable by low socio-economic society. Lip-reading from a speaker's (i.e., speech therapist) face is another traditional method of teaching spoken language to hearing impaired. However, the dedication required from a speaker, makes this job burdensome. Pronouncing the same word repeatedly makes the teaching problematic, if not impossible. Subsequently, a child loses engagement and interest in the learning process. Hiring speech therapist is also the financial overhead associated with the traditional lip-reading method.

To address the identified problem and the research gap found using systematic literature review (SLR) of the domain, the objective of the present research is to facilitate hearing impaired handicaps from low socio-economic society to mitigate their communication gap through lip reading using the proposed software application (learning technology). The proposed interactive software application (LOSINA - Learning Application without Sign Language for Profound Hearing Impaired Children) was developed for articulating English words following lip-reading method. The LOSINA presents the words in an interactive manner by selecting words containing vowels at different positions, i.e., vowels at initial, middle and final position of the words. The application demonstrates lips and mouth movements to show pronunciations of the words against a selected word. These words involve one to multiple tongue placements and lip movements. The proposed application implements the constructive pedagogy by progressing a student from single tongue placement and lip movement to multiple movements for a word pronunciation. Finally the proposed software application was evaluated for its effectiveness. A pre-experimental one-shot study design was used involving twenty male and female profound hearing impaired children (i.e., stone deaf). The assessment parameters were designed with the help and consensus of the sign-language teacher and speech therapist to assess the articulation of words by a child and his/her behavior. Evaluation was performed in five steps after every 25 sessions by three evaluators: sign language teacher, speech therapist and family members of the individual being experimented.

The empirical results from evaluation show increase in ability of word articulation by each profound hearing impaired child participated in the experiment. Moreover the improvement is getting significant as the number of sessions increases. The articulation of words by the profound hearing impaired children after experimentation is usually comprehensible for an inexperienced or a common listener. The improvement in natural voice quality, fluency and clear audibility of the tested words using LOSINA

within short time span, can therefore be attributed to a contribution of the present research. Articulation of phrases, sentences, emphasis and emotions in conversation shall be considered as future work of the present research.


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