

APDIP ICT R&D Grant Project

ICT Assisted Learning Tool for the Deaf in Pakistan

Progress Report

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Documents Compendium

Document 1: Hearing Impairment - Causes & Implications on Behaviour & Learning

Document 2: Pakistan Sign Language – A Synopsis

Document 3: Pakistan Sign Language Collated Data Sets

Synthesis

Around 250,000¹ deaf Pakistanis most commonly communicate using Pakistan Sign Language (PSL), a visual-gestural language that emerged as a result of interaction with Urdu and other regional languages of the country. PSL is recognized as a community language of deaf Pakistanis and has been adopted as an integral part of *total communication* approach by the Directorate General of Special Education's (DGSE) 1990 official policy. In a developing stage, PSL presently contains approximately 4000 different gestures. Unfortunately however, owing to multiple variations introduced by language/ dialect differences across the country and economic and expertise constraints, sign language resources and interpreters have always been at a premium and the use of PSL generally as also in the deaf teaching approaches has not been coherent.

To facilitate uniformity in use and enhance the access to and use of PSL for improving literacy of the deaf ², ICTs as a communication medium and learning instrument, are being explored through this Project for the first time in Pakistan. The research will explore the potential of ICT based PSL assisted teaching and learning. The Project Phase-1 explored, developed and classified a PSL symbols set. To instigate environmental concerns for the first time in the deaf curriculum new PSL for environment terms was developed as a pioneering activity. A literature review of available PSL resources and a document detailing the methodology for compiling a representative set of new and existing PSL are included with this report ³. These results are the basis for evolving technological educational variants under Phase 2 work that is presently underway. Modeling of PSL for CD packs and web mediums is on track and respective lesson plans are being devised. Also under development is the Urdu Alphabets – to – PSL converter software and PSL font. The next two phases focus on researching to evaluate the multiple teaching approaches involving ICTs and explore the various options of online/offline instruction techniques for deaf. The study findings carry a real potential channel of development for more mainstream ICT based educational products for the hearing-impaired segment of the society.

Research Problem

The visual/gestural Pakistan Sign Language (PSL) forms an integral part of communication of Pakistan's deaf people. For linguists however, PSL is a relatively new area of investigation as it is in a developing stage and like any other language is subject to changes, improvement & growth. Due to incoherent efforts in history, available literature on PSL was never synthesized to formulate a holistic view. Presently the deaf community in the country is divided due to the difference in sign languages used, and ways to teach deaf children in schools. As a result isolated communities of deaf people have developed their own dialects that are not easily understood by others. So gathering of standard signs set was an essential constituent of the project.

Noticeably, more and more domain information experts and deaf educators and teachers are acknowledging the need to improve the situation for the next generation of deaf children. Although there are some excellent examples of schools for deaf children in Pakistan, it is not possible in the near future to provide sign-language assisted education for all deaf children in separate schools for economic, cultural and logistical reasons. The ICT assisted approach hence is an effort to explore cost-efficient method having greater magnitude of outreach.

This project has two basic research and development objectives. First, we had proposed

1 Source : Ministry of Women Development, Social Welfare & Special Education
(http://mowd.gov.pk/special_education/disabled_population.htm)

2 A document discussing hearing impairment and assistive interventions is attached

3 Refer to documents 2 & 3 of the Document Compendium

to conduct an analysis to integrate a representative set of Pakistan Sign Language symbols through collation of existing and development of new signs. This would set the basis for the next two phases, which would simulate these symbols on offline (CD) and online (web) mediums and review through a micro and a macro level research respectively, the relative efficiency and effectiveness of variants of information technology as a communication medium and learning instrument for deaf in Pakistan.

Research Findings

Phase 1 of our project is based on the established fact that deaf people encounter difficulties in communication and as a result suffer from sub education. Being able to synthesize and make accessible their language would undoubtedly be of major use in both achieving goals of this project and in augmenting education and daily communication of deaf. Accordingly we undertook to gather existing PSL as well as develop new standard signs. We have now compiled representative PSL data sets. Work on Phase 2 in progress at present, focuses on PSL interface designing and creating connectivity with the application for CD production. Major findings with reference to the process so far have been:

- Data collection by observation of signing is one of the most important kinds of data to obtain. During the standardization process, it was measured that, it is also one of the most difficult methods and requires persistence, trust building and alignment with the SL interpreters.
- Pakistan Sign Language is an independent language in which the signs directly represent the concepts. The signs of PSL are the equivalent of the words in Urdu.
- We can postulate three categories of signs in PSL. arbitrary; indexic & iconic. Arbitrary symbols share no physical characteristics with the things that they symbolize and iconicity is only possible in signs with meanings that lend themselves to visual characterization. Deaf people find it easier to remember / invert signs of which they can perceive an iconic relation between the sign and its referent. Accordingly, when explaining terms (environment terminologies in our case) for developing new signs, it was easily comprehensible for PSL learners when either pictorially demonstrated or provided sufficient details and definition through signing. This inference was useful since the environmental concerns were being introduced to deaf through PSL for the very first time. During the development of new signs it was also observed that specific rules apply within the PSL and are unconsciously known by PSL users. Most signs are made in a limited area extending from the top of the head to just below the waist; the signing space is limited on the sides so as to form an imaginary square with the top and bottom.
- The history of PSL can be outlined through major processes undertaken by Sir Syed Deaf Association (SDA), Anjuman Behbood-e-Samat-e-Atfal (ABSA), National Institute of Special Education (NISE), and the Pakistan Association of Deaf (PAD). The developments include:
 - SDA work undertaken by Syed Iftikhar Ahmed was a pioneering initiative towards development of PSL. Of the 750 signs constituting the work, the Urdu alphabetic signs are recognized to date without controversy. However the other signs are the ones specific to the Rawalpindi region and thus not used commonly all throughout the country.
 - In 1986, ABSA compiled the first ever research manual on PSL in form of a dictionary. The work continued and translated over the following eleven years to publish seven booklets comprising signs of dictionary words, relationships, seasons, anatomy, numeration. Attempt was also made for the first time to present a story in sign language covering full sentence structure.

- NISE, established in 1976 realized the need for developing a standard PSL to prevent adoption of a wide range of differing signs for expressing the same meaning. In 1991 first publication carrying 1350 signs encompassing 27 topics was brought out through mutual consensus by representatives of 21 deaf associations all over the country. Regional variations were also recorded. A second PSL volume comprising 1600 signs bearing higher abstractions of specific terms used in subjects like science, mathematics, social studies and islamiat as well as grammatical terms was brought out in 1994.
- PAD started as a voluntary deaf club continues to focus efforts towards increasing the receptive and cognitive language development of deaf students as an aim to improve their level of education. It has worked in conjunction with IED Aga Khan University at Karachi for raising the need to subsume PSL as an integral mode of instruction in our educational system. This was emphasized to discourage failure rate due to hampered tutoring that comes by way of merely using speech. PAD studied teaching methodologies at different deaf schools in the country and reassessed and updated the existing signs through a team of PSL experts. As part of this Project, signs for environment terms were also developed, which is a pioneering work in the field carried out in collaboration with SDNP – IUCN. PAD has compiled and will be publishing its work in form of several books.

All these efforts have strengthened PSL as a representative language of Pakistani deaf and reasserted its importance as an indispensable instrument for enhancing the learning of deaf. All the available resources have been documented in form of a repository. The works by NISE, PAD and ABSA provide comprehensive and standardized data on various subjects. The lesson plans are being modeled on themes selected from these resources and will be sequenced according to the system of education.

Fulfillment of Objectives

The project is progressing as planned. We have fulfilled our proposed Phase 1 objective of collating a representative PSL data cluster. This prototypical exercise has set the baseline for the next two phases of the project. Currently in Phase 2 the educational packs are being designed. PSL hand signs are being simulated ⁴ to create connectivity with the front-end application. Associative lesson planning is also simultaneously progressing.

Designing of Urdu-to-PSL alphabet conversion utility, which is outside the scope of proposed work, has been undertaken as an additional exercise. This font of the alphabet symbols of Pakistan Sign Language, will allow users to learn the basic finger-shapes. The easy downloadable utility will come with information to help users get the software installed and working.

Project Design & Implementation

The project has been designed to go through three phases of development ⁵

Phase 1 Survey and collection of Pakistani Sign Language (PSL) symbols:
The compilation was scheduled for the initial four months and stands completed. The Phase implicated research; collection and documentation of existing/ new PSL symbols from all over Pakistan. The research on the

⁴ Video of Environment PSL is attached

⁵ Refer to section on Project Timelines in the original Proposal

history and development of Pakistani Sign Language to date⁶ was scientifically documented. Research methodology relied upon a literature review and feedback from a number of stakeholders that were selected to reflect the milestone PSL progress work. Interviews were conducted with key professionals, PSL experts and teachers from special organizations. Interviews examined many of the problems related to current practices and gathered views and perspectives on potential options for the accessibility of PSL by the sector. Data was collated by analyzing available PSL resources and observations of deaf people using those PSL symbols.

For developing and standardizing new PSL symbols for Environmental terms⁷ as well as updating grammar / general vocabulary a national seminar was organized by SDNP-IUCN in collaboration with PAD. Through a presentation, relevance of environmental knowledge as part of Deaf education was deliberated and accentuated keeping in view SDNP-IUCN's goals of sustaining development. The working sessions to devise national Pakistani sign language (environment) that all are capable of learning and understanding were led by experts from Pakistan Association of the Deaf. The session was well represented by sign language experts from nine cities of the country namely Larkana, Karachi, Lahore, Rawalpindi, Sukkur, Sargodha, Hasilpur, Pind Dadenkhan, & Bahawalpur. Selected environmental terms had been provided by SDNP-IUCN to PAD in advance. PAD had shared these terms with the representatives of deaf associations, and teachers of hearing impaired children all over Pakistan so as to allow ample time to them to come prepared in the seminar. The signs were discussed and agreed upon by common consensus before being finalized and recorded. Each participant's analysis was included to represent a sign. Important regional variations were also recorded. Subsequently, a compendium of 55 new environmental signs was produced. In later sessions signs for grammar and several other themes were also revisited and updated. A memorandum of understanding was signed between P.A.D. & the participants once all signs were finalized. A professional artist was engaged for illustrating the signs developed and standardized. During the course of the session, participants emphasized the value of signing for teaching the deaf children & also mutually agreed that deaf people needed signing for communication even though some of them had speech and were fluent with their oral communication.

Available standardized PSL and newly developed environmental signs are appended with this report. The principal investigation was led by researcher Dr. Nasir Sulman, in collaboration with IUCN Education Programme and SDNP. SPL signs have been organized and gone through for scan and animation to be linked up with the CD application.

The event received much recognition within the community and relative sectors. It was also picked up by local press and electronic media both nationally and internationally.

Phase 2 CD-ROM production & research on impact of ICT assisted learning / teaching of Deaf – Spread over a 5-month period, Phase 2 is currently underway. The subtasks of PSL interface designing and creating connectivity with the application for CD production will finish by mid July. Also under development is the Urdu-to-PSL converter utility, which is a

⁶ A complete literature review is documented in an attached report

⁷ Methodology of collecting existing signs & newly developed Environment PSL has been documented in appended report

downloadable software for converting typed Urdu to Pakistan Sign Language (PSL). A PSL font is being developed for it. This utility will import text from popular Urdu text formats like Urdu 98, InPage text, UZT and Unicode, for converting into finger spelling in PSL. This utility will be deployed on the CD and web and will be compatible with Windows based platforms. At the technical level, Pakistan Data Management Services have been engaged within the framework.

The small-scale research on effectiveness of ICT used in teaching/learning by deaf will follow. So the overall task will be completed on scheduled time (August 2003).

Phase 3 Wider research on impact of ICT assisted learning / teaching of Deaf – This is scheduled to be started in September 2003.

Project Outputs & Dissemination

Major Phase 1 output is the collated PSL signs (about 4000) for larger sharing. Another target accomplished was synthesis of the PSL data sets and lesson plans for producing CD and Web education products for deaf. Knowledge creation through development of new PSL for environment terms has been achieved. The success in attainment of these objectives would not have been possible without the involvement and cooperation of the deaf community and associated government, educational institutions, researchers and PSL experts. The syndicated approach has created awareness amongst manifold segments about the fundamentals of the research and the implications of employing technology, which will indisputably set apace the teaching of PSL itself and assisted lessons. The Project website interlinked with Phase 3 is under construction which will be publishing the work produced under the project for wider audiences. However, since the production of CD and website will be available for distribution after testing and research, it is premature to chart the extent of dissemination.

In addition, the development of PSL font and converter software will generate feedback and provoke auxiliary analysis, which will enrich and upgrade the utility for other applications.

Ultimately, the leading edge use of visual communication provides a real potential channel of development for more IT based educational resources for deaf. Evaluation by analyzing interviews, focus groups and observations of deaf people using the lesson plans, will identify ways the services may be improved for deaf users. Feasible solutions for technologies and applications will be determined in schools and education.

Project Management

Our main thrust has been promoting the use of ICTs for sustainable development. Building on our linkages formed during multiple interventions and managing the critical political dynamics of the special sector in Pakistan, we were able to bring together a consortium of Deaf sector stakeholders (PSL experts, tutors, interpreters etc.), researchers, educationists, special sector domain experts, and Urdu software developers.

In collaboration with Education Programme of IUCN, we also initiated knowledge creation through the development of environment PSL to foster awareness of environment and conservation in the targeted group. Keeping in view the community handicap, specialized information material and around 50 environment signs were developed.

Having experience with the development sector dynamics, we have been able to capture the true essence of the Project and draw in comprehensive perspectives, by working in continued association with Dr. Nasir Sulman, Assistant Professor–Hamdard University; Pakistan Sign Language Expert Team, Pakistan Association of the Deaf; Sikandar A. Babar, Aga Khan University Institute for Educational Development; Zohra Rehmatali, IUCN Education Programme Coordinator; and Asif Hisam, Pakistan Data Management Services (pioneers of Urdu Nastaleeq Internet software).

Impact

During this period of informal collaborations with multiple stakeholders, it has become very clear that this practical application of communication technologies offers deaf educators, a wide range of teaching opportunities at both primary and secondary levels. Learning of and through PSL can be expedited by use of new technologies. Tertiary establishments also see many curriculum opportunities in support of traditional teaching and the modern application of ICTs. The real reach and impact would be apparent once the PSL assisted learning is made available on CDs and web and studied for its effects on learning of and teaching to the deaf.

Overall Assessment

The Project has been running for six months and in that time has established that our primary stakeholders (deaf people) are receptive and excited with the prospect of using an ICT learning tool to enhance their capacities. Particularly in relation to dissemination of information, modern technologies are perhaps the easiest way to start and promise a widespread reach to the deaf community. The main thrust of the Project is a couple of bridges away but the learning process along the way has been highly valuable. The barriers to communication introduced by a natural limitation were overcome through a coordinated approach of relationship and trust building. Efforts so far amalgamated the considerations of all concerned beneficiaries including PSL interpreters, deaf educators, researchers and PSL developers in practical linguistic business. The scientifically documented baseline data will serve as a rich reference resource for researchers and PSL developers in future. On the whole, the Project has laid foundations of a unique paradigm, integrating efforts and building capacities, for carrying out further collaborative endeavors; investigations and pilots for ICT assisted deaf education at a national level. In addition to this, the larger community of Urdu language users is envisioned to be further strengthened once PSL education proliferates.

Accompanying Documents

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Sustainable Development Networking Programme, Pakistan

The Sustainable Development Networking Programme (SDNP) Pakistan is a part of the Education, Communication and Knowledge Management Group of IUCN - The World Conservation Union's Pakistan Programme. Formerly a global programme of UNDP, SDNP has been working since 1992 to promote access to information on sustainable human development among different sectors of society. It has been the pioneer of email and offline Internet in Pakistan, but lately its focus has been on developing knowledge management systems to strengthen development information services in Pakistan.

Apart from launching the Pakistan Development Gateway (PDG), SDNP has trained more than 260 organizations from the development sector to set up, maintain and update their websites, contributing significantly to the local content about Pakistan on the Web. This training in Web publishing has also been conducted in Urdu and Sindhi. More than 160 information rich Pakistani websites - related to both Government and NGO sectors - have been set up as a result of this activity. Other initiatives undertaken by SDNP include the creation of district websites and cyber community centres, promotion of open software like Linux, special training for women in Information and Communication Technologies (ICTs), work on District Management Information System (DMIS), and development of information gateways on the themes of water and northern areas of Pakistan.

IUCN – The World Conservation Union

IUCN - The World Conservation Union was founded in 1948 and brings together 79 states, 113 government agencies, 754 NGOs, 36 affiliates, and some 10,000 scientists and experts from 181 countries in a unique worldwide partnership. Its mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. Within the framework of global conventions IUCN has helped over 75 countries to prepare and implement national conservation and biodiversity strategies. IUCN has approximately 1000 staff, most of whom are located in its 42 regional and country offices while 100 work at its Headquarters in Gland, Switzerland.

In Pakistan, the Union seeks to fulfill this mission by empowering communities to participate in the implementation of the National Conservation Strategy.

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