

Comparative Study Between e-One Hand Finger Spelling and e-Sign Language for Hearing Impaired Persons Regarding Day-to-Day Activities Using an Object Oriented Approach

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Abstract—Day-to-day activities are important tasks for Hearing Impaired (HI) persons, particularly when HI persons communicate with others for normal life activities. To develop a modern technology through software development supporting HI persons is a challenge, because many factors affect such development like visual multimedia components , software engineering fundamentals , e-Learning principals for HI students , strategies of teaching HI students, modes of communication between HI students , visual programming application as well as Object Oriented Approach. However, in the current research, the authors tried to consider all the previous factors so as to develop two different e-learning systems for HI students .The first is to simulate real world One-Hand-Finger Spelling (OHFS) , and the second simulates Sing Language (SL), then applying three experiments for both systems on real HI class school. Results of the experiments were discussed accordingly. However, HI persons communicate one another through multiple kinds of communication like Lip Movement Reading, OHFS, Two Hands Finger Spelling and SL. In the two computer systems, Database system for displaying related video cuts and linking them with corresponding words is used. Around 3000 video cuts have been used with corresponding multimedia components via Visual Basic coding, about OHFS. Also similar Database System connected 54 images for OHFS to display spelling of images for each letter in the word by sequence. About Day-to-Day activities, common and most usable activities have been considered to be selected from the vocabulary of video cuts. An Object Oriented Approach is considered strongly to allocate each similar word in selected class. Five students have tried the two systems and tested three major experiments, However, results have been booked and analyzed accordingly. Final conclusion approved the efficiency of SL , the successful O.O.A in teaching SL and OHFS for HI students as well as both are friendly learning tools. .

Index Terms— OHFS (e-One-Hand-Spelling) , SL (e-Sign Language) ,O.O.A Object Oriented Approach , HI (Hearing Impaired) , Visual Multimedia , Day-To-Day-Activities

I. INTRODUCTION

This research work focused on modern software technology development enhanced with visual multimedia technique to support HI persons to communicate with one another via

Day-To-Day Activities. Why do some HI persons use SL while others use OHFS? Which method is more familiar with Day-To-Day activities ? Which method is more interesting for HI persons? Which method is more universal? and more questions need to be scientifically and logically answered . Thus , this research has been conducted. Using Software Technology enhanced with Multimedia technology and O.O.A would answer all the previous inquires. The idea of this research work could be summarized within the next few lines. How could we invest software technology to support HI persons in Day-To-Day Activities via kinds of communication. The authors developed two separated computer systems for the above purpose. The first system is to be used by HI persons who are interested in SL communication , The second system is for HI persons who use OHFS to communicate with others. Concepts of O.O.A, in classifications of vocabularies is considered to construct systematic frame knowledge in the brain of HI person. The two systems have been applied in real HI class room , results of the two experiments were examined and discussed logically to obtain final conclusions. Multimedia technology connected with Database is the core of building those systems particularly animation to display the video cut of sign related with SL or animated Images of OHFS. About mode of Reading Lip Movement , it was not covered .It is out of limitation, may be it would be considered in the future work

II. PROBLEM STATEMENT

Submit Problem could be summarized within few lines below :

How could the author develop two separated computer systems, one system displays only OHFS to read words and sentences , the second system displays only SL to translate words and sentences into the corresponding sign language cut. Visual multimedia is used strongly for both systems. Also Data Base must be used to support visual programming in accomplish each system. After completing both systems another part of the problem , it is to classify the vocabularies in systematic way , it is an Object Oriented Approach. The final part to perform the two system in three experiments. This

study is an experimental study.

III. OBJECTIVE OF RESEARCH

This research aims at :

A study of comparison between selected method of communication for HI persons via multimedia computer systems , methods are OHFS and SL. However the selected factors regarding compression relate to Day-To-Day Activities. Multimedia is the core of developing the two computer systems. Factors would be discussed in the sections of results and conclusion. Major factors of comparison are : which method is more universal , which method is more familiar with Day-To-Day Activities. Finally the research will answer the question of what is the effect of O.O.A in learning process for HI ?

IV. MOTIVATION TOWARDS RESEARCH WORK

1. According to our survey , little work has been done on this domain.

2. This research may help an important category of people who are physically disabled , multimedia technology via computer system is a powerful tool to support their physical handicapped. May be the two separated computer systems will support HI persons to develop and enhance their skills of communication via OHFS and SL

V. RELATED WORK

According to the author's survey , little work has been done in the area of the current research. One related work could be considered which is followed below :

1. Hussein , Karim Q , "Instructional Computer System for Hearing Impaired Persons" , Non Published PH.D. Thesis in Computer Science Subject , Symbiosis University, India . However this research developed specific theory in Teaching/Learning process for HI persons via e-Learning then developing selected model (Development of Instructional Computer Model for Designing e-Learning Modules for Hearing Impaired Persons (Technical Approach)" . Then developing an authoring system to generate e-Learning modules for HI persons. About modes of communication OHFS and SL , the mentioned thesis displayed both modes in one system but for learning school topics. Conclusion of research are wide , one of them showed a positive responses for HI students regarding practicing e-Learning modules. As general impression , e-Learning modules are friendly learning tools for HI persons in teaching/learning process.

VI. LIMITATIONS AND TOOLS OF RESEARCH

1. Visual programming with thousands of video cuts for SL and images of OHFS. Two computer systems have been developed , one only displays the objects of Day-To-Day Activities in OHFS , spelling by images only. The second system displays the related objects by corresponding SL

video cut for that object. Visual multimedia is the core of the two separated systems.

2. Data base to build the two systems, using data file systems via Visual Basic programming.

3. 54 Gif images for OHFS for first system and 3000 video cut for second system have been used.

4. Selected vocabularies have been selected for the two different experiments. Each vocabulary was selected according to the O.O.A to support HI person in developing his communication skills.

5. Two different experiments have been applied on real HI class room in India. Time of each experiment around 10 minutes. Number of students is 5 students in each experiment.

6. Statistical tools are only percentage ration of answers of students.

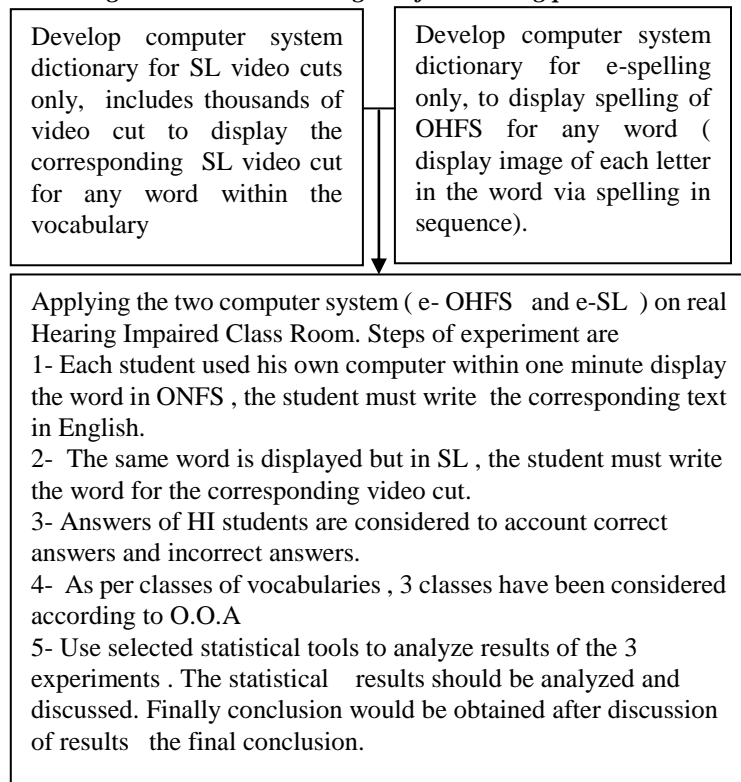
7. Day-To-Day Activities covered are three vocabularies food, school activities and general social skills.

8. Kinds of communication, OHFS and SL. However Lip Movement Reading is not included.

VII. WORKING PROCESS

Current research is an experimental research includes 3 experiments , each experiment contains of 8 different words in class of activities (food , transportation ,school activities , general social skills)

Fig1. General Block Diagram for working process



The next page represents the run-out form sample for each experiment only two words (time and cook) :

1. The word "cook" from vocabulary of food (two real run-out forms one represents OHFS , the second represents the corresponding video cut in SL)

2. The word "time" of general Day-To-Day Activities vocabulary . Also two real run-out forms, one represents OHFS and the second represents video cut for word "time".

Each pair of related real run out forms are displayed accordingly.

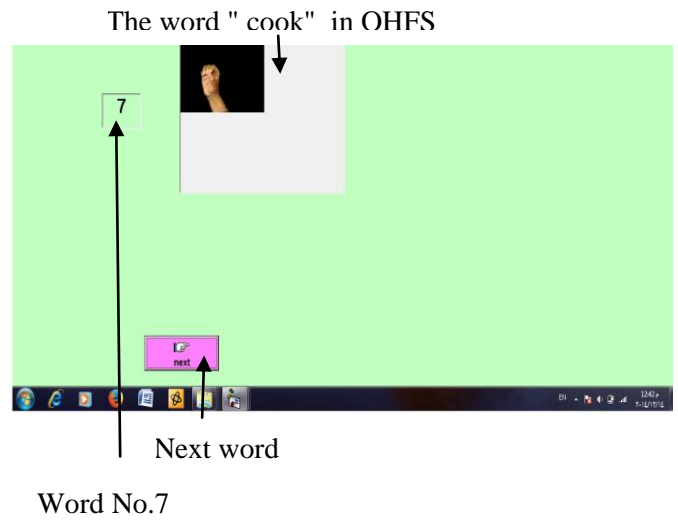
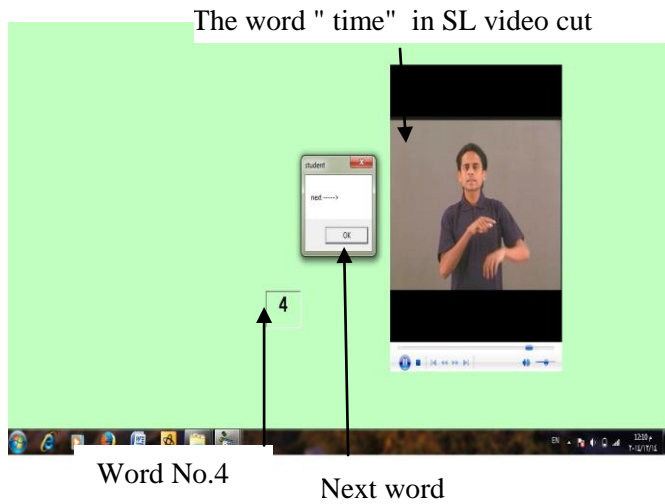
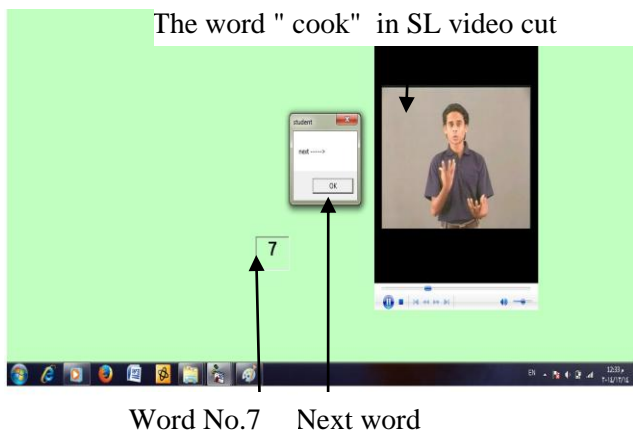
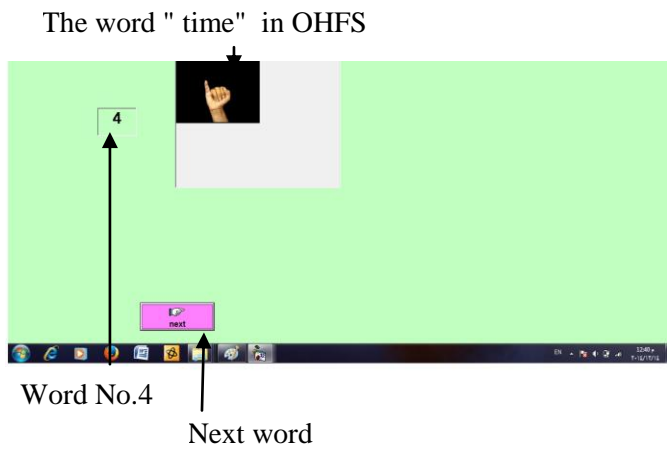


Fig.2 word No.4 (time) and word No.7 (cook) in two real run out forms OHFS and SL



VIII. RESULTS AND DISCUSSION

1) Display of Results Three different tables would be displayed to show the needful data so as to be discussed. Each table includes 8 records each record includes 9 columns, The below table represents class of "food".

Food Class (OHFS)					Food Class (SL Video Cut)			Status of usage in day-to-day activities
No. of Word	Word	Total students number	No. of correct answers	% ratio of correct answers	Total students number	No. of correct answers	% ratio of correct answers	Comments regarding both cases
1	eat	5	4	80%	5	5	100%	Wide using
2	banana	5	2	40%	5	5	100%	Medium
3	drink	5	3	60%	5	5	100%	Wide using
4	milk	5	4	80%	5	5	100%	Wide using
5	lunch	5	3	60%	5	4	80%	Wide using
6	sugar	5	4	80%	5	4	80%	Wide using
7	cook	5	5	100%	5	4	80%	Wide using
8	tea	5	3	60%	5	4	80%	Medium

Next table related with class of "school" words, some are used wide other medium used.

School Class (OHFS)					School Class (SL Video Cut)			Status of usage in day-to-day activities
No. of Word	Word	Total students number	No. of correct answers	% ratio of correct answers	Total students number	No. of correct answers	% ratio of correct answers	
1	draw	5	4	80%	5	4	80%	Medium
2	book	5	3	60%	5	5	100%	Wide using
3	read	5	4	80%	5	5	100%	Wide using
4	write	5	4	80%	5	5	100%	Wide using
5	dived	5	3	60%	5	4	80%	Wide using
6	calculator	5	2	40%	5	3	60%	Medium
7	ruler	5	3	60%	5	2	40%	Medium
8	pencil	5	2	40%	5	4	80%	Wide using

Next table is related with "general social skills of day-to-day activities"

General Social Skills Class (OHFS)					General Social Skills Class (SL Video Cut)			Status of usage in day-to-day activities
No. of Word	Word	Total students number	No. of correct answers	% ratio of correct answers	Total students number	No. of correct answers	% ratio of correct answers	
1	hear	5	3	60%	5	5	100%	Wide using
2	family	5	2	40%	5	4	80%	Wide using
3	taxi	5	4	80%	5	4	80%	Wide using
4	time	5	3	60%	5	5	100%	Wide using
5	keep	5	3	60%	5	3	60%	Medium
6	choose	5	3	60%	5	3	60%	Medium
7	help	5	3	60%	5	3	60%	Wide using
8	take	5	2	40%	5	4	80%	Wide using

Next paragraph , professional discussion would be displayed regarding the previous results.

2- Discussion of Results: Food class , 8 words with 5 answers for OHFS and SL vide cuts words which are wide using are almost 100% by SL however OHFS somehow less results . Reasons are SL is easy to be understand by HI student. Words are wide using and universal. The word banana is poor result in OHFS because hard to trace long word.

School class , also 8 words with 5 answers for each. Ruler and calculator are poor results in SL because they are rare according to other words in the class. About words calculate and pencil are low results because long words are hard to be traced in OHFS by HI student.

General social skills class , It is big vocabulary , some selected words have been selected , some of them are wide usage , others are medium. The word hear is familiar with HI students , in SL 100% as well as the word time. Other word are expected to obtain such results in SL. The words Help , choose and keep almost medium results because such words have no clear or exact motion to represent them. For example the word sleep has very clear sign motion to represent it. About OHFS , it is expected somewhat high results than results in table but may be the nature of using computer and environment caused some tension to HI student.

IX. CONCLUSION

After completing the three tests and analyzing results , the authors summarized their conclusion as shown below:

1) Object Oriented Approach is a successful training course for practicing SL as classes of vocabularies to guide HI student towards the correct sign language corresponding to the word. Thus O.O.A enhanced with visual Multimedia is suitable approach to teach HI students regarding Day-To-Day Activities.

2) From results , it is clear that SL video cut is better results than OHFS. Thus SL is better mode of communication than OHFS.

3) Some low results of OHFS indicate that long word is hard to be traced accordingly. HI student needs more practice regarding OHFS particularly for spelling in OHFS in long words and fast spelling.

4) SL is easy to be understand because it could be recognized without more training. When HI student sees sign of drink he will direct understand(it means the word drink).

5) Some medium usage words like KEEP , it has special sign thus HI student must train on such words.

6) SL is universal language for all countries, it needs not for special training except some medium or rare usage words.

7) From observation during the three experiments , experts found HI students were interesting and enjoying while they were using the two computer systems. Thus such computer systems which enhanced with visual multimedia technique are friendly learning tool for HI students and motivate HI students to learn. .

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