

## Observation on the Deaf Students' Interaction in Learning ICT-Courses

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*Abstract:* - The existence of computers has proven to be important in human's life, as it offers the means of communication between individuals via Internet. Computers that acts as a learning platform for education is an essential technology; thus the humans' accessibility issues in Web applications are crucial. This includes the Deaf Students. The objective of this research is to observe and study the Deaf Students' levels of ICT knowledge, ICT use, ICT satisfaction, and interest on Computers and ICT and how they interact with ICT in this technology era. The Methodology of this research is Observation. Comparing to the schools that do not have adequate computer equipments (hence without any ICT courses offered), a total of 3 schools executing the Hearing-Impaired Education Program (that offers Computer Graphics Course) from the whole of Malaysia were selected as the research locations. Therefore this brings a total of 6 teachers and 54 students (22 students from Terengganu, 15 students from Negeri Sembilan, and 17 students from Johore) respectively as the research sample. In evaluating observation results, the teachers managed to accomplish each session's learning objectives for each school, as the students had shown positive respond in the Computer class. In contrast with the schools that do not offer any ICT courses (due to the inadequate computer equipments), the observation held in all 3 schools unanimously showed that the Deaf Students have no trouble learning ICT courses, and interacting with the computer equipments, mainly because computers are deaf-friendly. Moreover, computer enhances the students' deaf-creativity in graphical visual of drawing images, web-design, 3D-animation, and multimedia purposes.

*Key-Words:* - ICT Education; E-Learning; The Deaf Students; Computer Courses

### 1 Introduction

The existence of computers has proven to be important in human's life, as it offers the means of communication between individuals via Internet. Computers that acts as a learning platform for education is an essential technology development; thus the humans' accessibility issues in Web applications are crucial. This includes the Deaf Students. Web Accessibility also motivated academic teachers to include this theme in online Internet courses. It is very crucial for the public to have the capability and the right to use any software, hardware or assistive technologies to understand and interact with the website content, regardless disability, geographical location, language barriers, or other impairing factor [1]. To support this, the Ministry of Education Malaysia has introduced the concept

'Education for All', which means that equal opportunities and education services should be for every students, regardless religion, race, sex, and the individuals' difference, without unbalance the normal and the deaf students. This concept focused on their ability, skills, development, and achievements.

The Deaf Students' higher education is crucial, as it allows them to attain valuable knowledge and skills for social survival and employment, just like the Normal-Hearing Students. An individual with disabilities is integrated in as natural an environment as possible, as defined in Education in a fully inclusive model [2]. The Disable Ones shall not be let off from the education system just because they're disable. The disable ones can further their studies, with a logical amendment to suit them, like the infrastructure, equipment and teaching materials, and

the teaching methods. Nevertheless, for The Deaf Students who does not have the ability to perceive sound due to their hearing-loss, this affects the ability to both receive and produce spoken language. Hence, the Sign Language is used by these students to communicate with one another. In higher education, many universities institutions do have interpreters who are fluent in both signing and speech, to support the students and teachers in the Education process. This study investigates the problems and obstacles faced by the teachers of the Deaf Students (in ICT Courses), and simultaneously, observe the interaction of Deaf Students with ICT tools in their class.

ICT Education has increasingly become a demanding subject in the higher education, not only for the normal students, but for the deaf students too. Subjects like Computer Graphics, Multimedia, Web-Design and 3D-Animation, are among the popular courses, as it attracts the vision of these Deaf Students, being hearing-impaired. The continuous computer technology development has made ICT and Educational Technology becomes progressively more vital in education. Subject to learning in an online-virtual environment, although Academic educators play a primary role in the use of online learning environment by students, these students can only utilize those that the educators make available to them, in a specific learning context [3]. ICT Education field offers high-paying challenging careers, which are accessible to the Deaf Students. Computing careers are potentially open to students with disabilities because of advancements in assistive technology that provide access to computers [4]. Moreover, ICT has unlocked many opportunities for the Deaf, because most jobs in ICT industry uses computers which are deaf-friendly. With computers, many career opportunities are open up for the Deaf, like Data Entry, Graphics animation, Programmers, Technical Computing, Web Design Development, systems designers, computer scientists, software developers and other IT professionals.

ICT Education is important for the Deaf Students. Supported visual media aids like graphs, charts and tables are frequently used for computer education, as these students have to depend more on vision, due to their defect of hearing [5]. Computers are adaptable to the Deaf Students, hence ICT education does fit for them, because it requires minimal supervision, deaf-creativity, as computers are Deaf-Friendly. Since the deaf students have lost their hearing senses, most of them are highly skilled

in visual aspects like drawing and designing. They excel better in areas like Web Design, Visual Arts and Graphics Animation. This perspective is suitable for them to learn ICT courses, as it shows how they interact with the learning materials via a computer.

## 2 Research Methodology

This study is descriptive where it explains the current status of the existing scenario that is being studied. This method emphasized on the current practice and the criteria that exist in a situation, and the process involved forming the situation.

This study uses Observation whereby the purpose is to observe the situation in a classroom between teachers and students. Observation is chosen because it gives the researcher a full surveillance towards the students' activities in class, interaction with teachers, and studies the learning materials through the computer. In this research, Observation generates a more consistent result from the respondents, as researcher could see themselves the picture in that particular situation. Moreover, this study also explores the current scenarios in three schools, by understanding the relationship among the teachers with students, and the students' usage of computers, and their interests in the ICT courses.

This study was carried out in the schools that offer the ICT Course (Computer Graphics) for the whole of Peninsular Malaysia, Sabah and Sarawak, to be compared with the schools that do not have adequate computer equipments to have ICT Courses. The location background chosen was the Secondary Schools executing Hearing Impaired Education Program (in specific, the Computer Graphics course). Altogether, there were 3 schools involved as the research location, which consists of 1 school in Negeri Sembilan, 1 school in Johore, and 1 school in Terengganu. This means that there were 3 schools that became the location of data collection.

### 2.1 Research Instruments

For this study, the research instrument was use when Observation was conducted. Observation is a popular research method among researchers and respondents involve because it gives information impulsively in the scenario itself. This is important because observation generate researcher's answers faster as it is studied face to face. Observations have given watchfulness towards the environment, by analyzing the scenario, organized the data and interpret them.

The observation is performed to answer all the research questions prepared. There are two categories of group identified for this research; therefore researcher has focused on both groups concurrently, yet in the same observation. The usage of two different groups allow researcher to gain information from different students of different groups. Both groups, consists of the teachers teaching the Course for The Deaf Students, and the students who are The Deaf Students in the class. These two groups are then compared with the observation held in other schools that do not offer ICT courses.

The aspects of this study were analyzed in accordance with the aspects of the problem stated in this study. This observation seeks to explore the Deaf Students' interaction with computers, concurrently observe their levels of knowledge, understanding, use and most importantly their interests on the course taught (Computer Graphics). Simultaneously, these observations also focused on the teachers' ability in overcome the problems dealing with the Deaf Students while teaching the Computer Graphics.

## 2.2 Research Sample, Data Collection and Data Analysis

The research sample involve in this study, are The Deaf Students in the Computer Graphics classes, and the teachers teaching the Deaf Students the Computer Graphics Course. This is then, compared to other schools (that do not offer ICT Courses). Researcher has used the Non-probability sampling to choose the classes for observation. Through this technique, classes were chosen based on their time table, of which day the Computer Graphics course is being held in that particular period (for all 3 schools). Researcher did not ask for the help from the teachers', as researcher just sat at the back of the classes, and observe the classes in sessions. This is to get an internal perspective of the teachers and students involved in the class, to get data based on their experience, knowledge and ability towards the students' understanding, interaction and interest.

Table1 shows the distributions of the research sample in this Observation (schools offering ICT Courses). There are 6 respondents (teachers), with 2teachers from 3 schools, and 54 respondents (students) from Negeri Sembilan (15), from Terengganu (22), and from Johore(17).

**Table1: Distribution of research sample for Teachers and Students (offering ICT Courses)**

	Total Respondents	%
<b>Students</b> - N.Sembilan - Terengganu - Johore	(15) (22) (17)	90%
<b>Teachers</b> - N.Sembilan - Terengganu - Johore	(2) (2) (2)	
<b>Total</b>	<b>60</b>	

Data collection was done by the observations sessions in all schools (4 classes each week, for 2 weeks in each school), during their process of teaching and learning. Researcher do not wish to disturb the PnP (Teaching and Learning) in each school, therefore each observations conducted are based on the subjects' timetable given. All observations were written down, and each one took around 40 minutes. Researcher had started with schools that do not offer ICT Courses, and then followed with schools that do offer ICT Courses (Terengganu, Negeri Sembilan and Johore). All the observations sessions were done weekdays, and it took almost 2 months for the researcher to complete.

Based on the data analysis, the data of this study is the qualitative data. This data is designed in such a way where it generates respondents' actions directly and straightforward; hence it is easy for researcher to analyze them. Overall, the observation has given alertness towards the context, by analyzing the answers, organized the data and interpreted the data.

## 3. Findings

A total of 6 teachers that taught the ICT Course (Computer Graphics) for the Hearing-Impaired Education participated in this study. From that total, 4 are female teachers, and 2 are male teachers. The number of teachers in this study is 6, being 2 teachers from each school, and there were 3 schools involved in this study. For the race category, 5 teachers were Malay, and 1 teacher was Chinese. A total of 54 students participated in the Observation sessions of the ICT Course (Computer Graphics) for the Hearing-Impaired Education in this study. From that total, 22 students are from Terengganu, 15 students from Negeri Sembilan, and 17 students from Johore.

For the 1<sup>st</sup> school (Terengganu) observation, two teachers were involved in the Computer Graphics course. The ICT tools and equipment that can be seen used in these classes in sessions are laptop; LCD and projector (for Powerpoint and Word notes), a printer and the scanner. The class sessions took place in the

computer labs, and the classes always have adequate numbers of computers for each and every student. Overall, the software used are Macromedia Freehand 3, Adobe Photoshop and Macromedia Flash and 3D Studio Max. In these observations, the students' tasks (lessons) required the students to draw a logo. The steps to achieve this are explained in the Module book provided. Each steps generated an output, and the outputs were print-screened into Microsoft Word.

The ways the students learn are the same like the normal-hearing students, except they communicated using the sign language. During the practical sessions some problems were encountered by some students; however the teachers practiced the 1-to-1 method in assisting students' understanding, simultaneously in helping them to solve the problem they encountered. The teachers do give equal attention to each and every student, individually. The bond between the students and the teachers are stronger and closer.

In this observation too, it can be seen that the students are very cooperative and helpful with one another. The bonds between students amongst them are very close, as they do interact with one another, and help each other in each and every step. This behavior are always seen when one student stumbled on a problem, another student will teach the other student in completing the tasks given. This way, the students help each other in understand the lessons taught by the teachers, and simultaneously increased their interest and appreciate the lessons better.

In terms of the course's learning objective, the teachers manage to deliver them successfully; this was proven because every student managed to create a very attractive and creative outputs. Also with the help of the module handouts given by the teachers, the guidelines are really helpful, and are easily perceived by the students. The modules given to the students really help them in understanding the tasks required; hence a good quality graphic was produced.

For the 2<sup>nd</sup> school (Negeri Sembilan) observation, also two teachers are involved in the Computer Graphics course in this school. The ICT tools and equipment that can be seen used in these classes in sessions are also the same as the previous school. In this school, the classes in session also have enough numbers of computers for each and every student. Throughout the whole observation sessions, the softwares used are also same as the previous school. In this observation, the students learned how to edit photos, whereby the steps to achieve this goal are explained in the Module book provided.

In this school too, the students were given full commitments and attention for the entire observation sessions. In the whole observation, it can be said that the students were very smart in interacting with computers, as they do not have any problems using the computers. The teachers have experience in educating the Deaf Students as they always know how to get the students' attention back. With regards to the teachers' preparation, it shows that the teachers in charge were prepared for each and every session's classes. The teacher had prepared handouts for the students, obtained from the Module guidelines, and the students were into the guidelines notes. Throughout the lessons, the students are extremely fast in completing the complete steps. Some steps are done by the students even before the teacher had reached that part. This really shows that they are really alert into this lesson, and their deep interest really lies within computer courses. Further/detailed explanations were always given to the students that encounter problems in understanding the teacher's teaching, in a 1-to-1 form. It is really obvious that the bonds between the students and the teachers are stronger and closer. Two-way communications exist here, whereby not just the teachers are teaching and educating the students, however the feedback from students are also positive, and students did asked questions to the teachers when there's a confusion.

All through the observation, the learning objectives are accomplished successfully. The students could interact with the software and the computer application really well. Furthermore, the students fully understood what was taught by the teachers, following the module guidelines handouts. There was no confusion detected by researcher in the Deaf Students' throughout the whole observations sessions in this school, as the students could really appreciate the notes of handouts easily. The modules provided truly help them to complete the tasks required. As a result; each students eventually managed to produce a very beautiful outcome, since they received the learning objectives correctly. The final object looks really beautiful, having layer by layer (3 photos mentioned before). Even after deleting the waste lines, no white angles can be seen.

For the 3<sup>rd</sup> school (Johore) observation, there are also two teachers in charge of the Computer Graphics course in this school. The ICT tools and the software used. In each sessions of observation, the class always started with the teacher question the students on what was taught the previous day, and asked them

to recall back what they have learnt. The teachers claimed that this is necessary, to test their memory skills before teaching a new topic. The results showed positively that the students could recall what was being taught, and this proved that the learning objectives were delivered effectively. In either case, teachers would then do a quick recap on the topics taught previously. In this school, the teacher combined both theory and practical classes together, as according to the teachers, this helps the students to learn and understand better, rather than having 2 separate sessions of theory and practical differently.

Although there were long sentences in the assignment, it seems that the students have no problem in understanding them, when being asked by the teachers. In completing this assignment, the students were also given the chance to surf internet to find out more information/pictures, and based from this observation; it seems they can use the internet (Google Search) efficiently. Overall, the students are very independent as they are able to continue doing their work themselves, with minimal supervision from the teachers. At times when they stumbled on a problem, they would ask the teacher or their classmates for help. In terms of the relationship between the students and the teachers, it can be seen that their bonds are really close. They show a symbol of respect and committed towards their teachers.

In conclusion, throughout this whole observation, the response from the students in this Computer Graphics classes are very satisfactory, as they do really show a very deep interest in computer application. It is very clear that the students are really interested in this course, as they really gave full commitment towards the teachers' explanation.

In terms of the teaching and learning process, the teachers has used various methods to approach students, simultaneously to help them in fulfilling their needs and overcome the problems they encountered. The students gave very good commitment and cooperation amongst them, and their work results are really attractive. The students' creativities are shown here, as each student have different capabilities / creativities. In the end of this visit, researcher had a good look at the students' portpholios, and a lot of attractive photos artwork can be seen over the years.

#### 4. Discussions

For all the three schools, it can be seen clearly that with regards to the ICT courses (in this case, the

computer graphics course), the Deaf Students do learn fast in comprehending what's being taught using a computer. Comparing to schools that do not offer ICT courses, inadequate computer equipment does hinder the Deaf Students to learn ICT courses.

Since these three schools have adequate computer equipments and classrooms/labs for each student, computer courses have become their favorite subject compared to other subjects. This is because they have their own freedom and space to fully utilize the computer and other ICT/multimedia tools, rather than sharing one computer with their classmates. Therefore, this creates a comfortable learning space for the Deaf students to master the computer usage. The same goes for the teachers, by having sufficient facilities and teaching aids to teach the students, this do improve the effectiveness of learning, because only then a fun/interesting satisfying environment can attract students to be interested in studying. These teaching aids include laptop, LCD, embedded e-dictionary, visual/images, flashcard, newspaper, magazines, reference books, charts, 3D objects, and the internet (to visit-sites).

Nevertheless, all the 6 teachers (from the 3 schools) that are teaching the Deaf Students, do claim that the Deaf Students are slow in understanding a concept (compared to the Normal-Hearing students); however the Deaf Students manage to accomplish the learning objectives eventually. More attention is needed for the Deaf Students, as they depend more on their vision. There are also at times, where the students are being emotional or moody, where they tend to show their act of lazy or stubborn, hence they could not commit fully towards the class in session, hence the learning objectives for that day will not be achieved. However, in contrast when they are fully committed, the students are very cooperative towards the teachers, and even among their classmates. A very strong bond of cooperation can be seen clearly in all these three observations in all three schools.

In the schools that offer ICT Courses, the teachers do have the *e-dictionary* to help them and the students to find words they don't understand. This helps both the teachers and the students, as the e-dictionary are embedded in all computers, to ease the students' understanding. Moreover, these words embedded in the e-dictionary do come with pictures; hence it's easier for the students to understand them.

Nonetheless, in all observations (schools that do/don't offer ICT Courses), a similar trait can be seen which is, there are some words of KTBM (that

contains specific ICT terms) could not be explained perfectly. This is because some ICT terms are difficult to sign. However this is overcome by explaining using images, rather than the spelt-words itself. Even for the class teachers' PowerPoint notes/slides which contain the learning materials, the students tend to understand better with the help of the graphical images, compared to the lengthy words.

Another issue, when being asked about their performance in examination, all the 6 teachers (from the 3 schools) unanimously answered that the biggest difficulty the students face is when they are sitting for the ICT exam. This is because the environment in an exam is totally different compared to in class, whereby they can get assistants from the teachers; however in exam, there are certain limitations to that. The teachers claim, that it's very common for them to not only forget what they learn, but also it's common for them to have trouble reading the lengthy questions asked, as this would generate difficulties for them to understand what the question required. However when the questions include images, visual graphics or arts drawings, then only the students manage to answer the questions.

In conclusion, in these 3 observations, the Deaf Students are really more interested in ICT courses, which contain more visual graphics. This is mainly because the students are more attracted to courses containing attractive graphics, multimedia-supported content, and attractive animation and designs. This perception is more suitable for the deaf students, as the elements catch their attention/vision, compared to the plain non-graphic courses. Combining with a very interested and committed group of teachers who are committed in teaching these students, the Course could not be more interesting to learn.

## 5. Conclusions

In conclusion, overall these observations proved that the Deaf Students have no problem interacting with the learning materials in computers. However they do need special attention, because these students require teachers' vision to look at them all the time, since they could not voice out. In cases where there's confusion, The Deaf Students do not hesitate to raise their hand and get assisted by the teachers. Even the teachers are fully-committed to the students, making sure the lessons are understood, encouraging the implementation of teaching and learning.

Most teachers do agree that ICT courses offered to the deaf students are really adaptable to them,

since computers are deaf-friendly. Some teachers claim that the Computer Graphics course taught to the Deaf Students do attract their interests more than other normal subjects, which simultaneously students tend to score better in this course, compared to other reading language or even mathematics.

Comparing to the schools that do not have any ICT courses offered, when being asked any ICT courses should be offered to the Deaf Students in future, the teachers unanimously agreed in wishing to have more graphically courses like Computer Graphics, 3D Animation, Multimedia and Web-Design; because the students can use embedded software to improve more skills using computers.

Learning ICT Courses will give The Deaf Students chance to be professional in the ICT era too, and develop their own potentials concurrently. Opportunities should exist for the Deaf Students to enable them to be independent. In terms of ICT Education for the Deaf Students, computer courses were definitely a demanding major, as this research proves that having the ICT Courses was resulted in a positive response from the teachers, and the students themselves. By having it via E-Learning, The Deaf Students can learn these courses independently at their own ease, in combination with some reference books/notes as guidelines. After all, computers can be access anytime and anywhere, for them to attain the tutorials, notes, slides etc, and they can learn them within their own space.

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