

ICT in Education for Deaf Learners: Teachers' Perspective

Norazah Mohd Nordin, Rozniza Zaharudin, Mohd Hanafi Mohd Yasin, Rosseni Din,
Mohamed Amin Embi and Maimun Aqsha Lubis
Faculty of Education, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia

Abstract: The existence of computers and the Internet were important in human's life as it offers an entrance into the World Wide Web. The web that acts as a platform for e-Learning education is an essential technology development thus humans' accessibility issues in Web applications are crucial. This includes the deaf learners. The objectives of this study were to investigate the levels of knowledge, usage, satisfaction and interest of the secondary school teachers (involved in the Hearing-Impaired Education Program), on computers, ICT and e-Learning for deaf learners. This study used a mix method of both qualitative and quantitative. The primary method of this research was interview whereby two teachers were being interviewed from each school, to view their opinions. All schools executing the Hearing-Impaired Education Program (total of 24) from the whole of Malaysia were the research locations therefore bringing a total of 48 teachers as the research sample which were also the research population. The interview results revealed that teachers had shown positive results in having ICT education (online) for the deaf learners, mainly for reasons like computers being deaf-friendly. Moreover, computer enhances the students' deaf-creativity in graphical visual of Drawing images, Web-design, 3D-animation and Multimedia purposes. Results also showed that the majority of respondents were not satisfied that deaf learners were not included in the popular computer courses in schools. The implication of the study was that ICT courses should be included in the curriculum for deaf learners. Further research on the development of computer courses which enhance deaf-creativity should be done.

Key words: ICT education, e-Learning, deaf learners, deaf-creativity, computer courses, secondary education

INTRODUCTION

e-Learning creates new challenges for educators, curriculum support services, disability support services and institutional administrators. Educators need to accommodate diversity within their curriculum, for example the way they design their subjects, plan the learning experiences, identify the learning materials and assess the outcomes (Din *et al.*, 2011). Moreover, educators need to develop expertise and IT skills in creating learning experiences that utilize the e-Learning technology, like designing curriculum materials that can be placed on the Internet or stored on CD ROM. Instructing on the web does eliminate the boundaries of time and space which allows for flexible instruction. The existence of Internet and computers has established to be important in human's life as it offers an entrance into the World Wide Web. The web that acts as a platform for e-Learning education is an essential technology development thus the humans' accessibility issues in web applications are crucial. This includes the deaf learners. The web evolutions given by legislation on web accessibility have also motivated academic teachers to

include this theme in online Internet courses. Following a research on web accessibility, it is crucial for societies to have the capability and right to use any software, hardware or any assistive technologies to understand and fully interact with the website content, regardless of their disability, geographical location, language barriers or other impairing factor (Sierkowski, 2002). To support this, the Ministry of Education, Malaysia has introduced the concept Education for All, implying that equal opportunities and education services should be equal among students, without judging the aspects of religion, race, sex and the individuals' difference, hence without unbalancing the normal-hearing and the deaf as well. This concept focused on the ability, functions, skills, development, power and achievement of these students towards the skill development.

Although, mental abilities of the normal individuals and the deaf learners are at the same level, however majority of these deaf learners today still show low reading/writing and mathematical abilities (Drigas and Kouremenos, 2005). While some educational institutions may have accidentally cultivated their education system separately for the deaf learners 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 deaf learners, 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 have a total control over these individual because the lessons and studies content for the deaf learners are prepared by the educators.

Online learning, also known as electronic-learning can be defined as the learning education conducted through the computer technology medium (Boettcher and Conrad, 2004). Since, there is no face to face interaction that exists, learning via electronic means that the learning is carried out in advance, virtual-learning spaces. It is extremely vital that these Virtual Learning Environments (VLE), Learning Management Systems (LMS), Web-Based Trainings (WBT) and other e-Learning applications and educational technologies are to be accessible to all type of individuals (Debevc *et al.*, 2007), mainly in this study are the deaf learners. e-Learning is convenient as it can be implemented anywhere, at anytime. The e-Learning advancement approaches has becoming more improvised with the continuous developments of technologies thus academic staffs should always be efficiently consistent and steadily up to date incorporating these rapid developments into the web-based environment. Every higher learning educational institutions requires a structure that provides their academic staff with the essential means to encourage better institutional involvement. Making e-Learning and educational technology accessible defines the content, communication and the construction parts must be taken seriously and made accessible to the deaf learners. Many e-Learning portals have been developed online, to deliver various types of education. However, the goal is always still the same, to provide a way to organize various collections of ideas in the e-Learning portal hence individuals can carry out informal self-assessments that generate feedback. Many research studies have suggested that the integration of technology can improve academic performance, enhance motivation and promote learning (Curtin, 2002).

ICT with their continuous development provide new possibilities for the creation of innovative and effective environments of teaching and learning, therefore redefining the educational processes (Liodakis *et al.*, 2005). The objectives of this study were to investigate the

levels of knowledge, usage, satisfaction and interest of the secondary school teachers (involved in the Hearing-Impaired Education Program), on computers, ICT and e-Learning, for deaf learners.

Background review: The deaf learners' higher education is significant as it allows them to attain valuable knowledge and skills for social survival and employment, just like the normal-hearing learners. An individual with disabilities is integrated in as natural an environment as possible as defined in education in a fully inclusive model (Morrison, 2004). Nevertheless, for the deaf learners who do not have the ability to perceive sound due to their loss in the sense of hearing, this affects the ability to both receive and produce spoken language. It is rather common for deaf learners 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 them. Communication between the deaf learners and the normal individuals can be difficult. For people who are born deaf, English or their native language is often a second language with the 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 deaf learners. The only exposure to signing is at school as they are not often absorbed in language the same way as the normal-hearing children does. Without this absorption, deaf learners may miss the critical period for language acquisition. Moreover, to achieve an effective stage for developing language-related skills throughout childhood and later in life then these deaf learners must be directly and repeatedly presented with signs, words and language concepts to avoid language development delays (Huang *et al.*, 2008). Hence, the Sign Language is used by these individuals to communicate with one another. In higher education, numerous universities institutions have interpreters who are fluent in both signing and speech, to support the deaf learners, teachers and staff in the education process.

The rapid web evolutions given by legislation on web accessibility have also motivated educators to include this theme in Internet courses. Web accessibility defines the ability for everyone in society to have the right to use any software, hardware or any assistive

technologies to understand and fully interact with the website content, regardless disability, geographical location, language barriers or other impairing factor (Sierkowski, 2002). Students with disabilities should be less a special concern and instead seen as part of the regular, diverse classroom membership as programs need to be designed to be inclusive of everyone. From the legislative point of view, inclusion is supported by incorporation of the hearing-impaired individuals either directly to mainstream education or to special education, in the mainstream schools or the special schools for the Hearing-Impaired. Although, the deaf learners are prone to hearing, there are individuals who are rather inclusive by having high performance capabilities in specific fields like artistic and creativity, intellectuality and leadership aptitude or in any given academic areas. This is of course, taught, learnt and shown with the help of the Sign Language. In other words, the deaf learners will portray what is being taught through the Sign Language in their daily behaviorism activities. Usually, a successful inclusion occurs when an individual is given all of the supports needed whether it's physical (assistive technology like hearing-aids) or human (a trained assistant) and when the level of the disability matches appropriately the environment into which the individual is placed.

ICT education has increasingly become a demanding subject in the higher education, not only for the normal individuals but for the deaf learners too. The teaching and learning process is extremely complex for them since, it involves people with different abilities, needs and expectations. Thus, ICT can act as the right use of skills and techniques in education and focuses on the effective transfer of human learning, regardless the teaching tools (Campanella *et al.*, 2008). To ensure they have full access to computer applications and programming tools, academic educators teaching computer courses must make efforts to make this possible, alongside with the existing tendency towards teaching Graphical User Interfaces (GUI). Courses like Computer Graphics, Multimedia, Web-Design and 3D-Animation are among the popular courses as they attract the vision of these deaf learners, being hearing-impaired. It's not just computer courses that need multimedia-supported technology but other courses too. In a study conducted on learning mathematics (Tarmizi *et al.*, 2008), research found that utilizing technology together with their associated instructional efficiency can be useful for instructional researchers and educators, for the whole concept of teaching and learning. With this way, students who are not only ICT literate but also Mathematics literate

is drawn to trying out new ideas. Hence, ICT courses are as equally important as other courses. These subjects are taught, learnt and shown with the Sign Language.

The continuous computer technology development has made ICT and educational technology becomes progressively more vital in education. However, subject to learning in an online environment although, academic educators play primary roles in the use of online learning environment by the deaf learners as these students can only utilize those that the educators make available to them, in a specific learning context (Bolliger and Wasilik, 2009). Online teaching does allow teachers and students to work from all around the globe with the Internet connectivity, however it significantly increases the teachers' effort per student. The concept and use of ICT in teaching and learning should be readily accepted and understood by the future academic educators, regardless their good academic achievements and self-reliance and good personality (Lubis *et al.*, 2009a, b).

The computer education field offers high-paying careers yet rather challenging which are accessible to the deaf learners. Moreover, ICT has unlocked many opportunities for the deaf because most jobs in ICT industry uses computers which are deaf-friendly. By using computers, many career opportunities are open up for the deaf, in such areas like Data entry, Graphics animation, Computer operations, Computer programming, Computer technician, Software testing and development as well as Web design development. In moving towards a more technologically literate and thinking workforce, the deaf learners must be able to perform in a global work environment and make full use of the tools and technology available in the information age (Lubis, 2009). This is to increase the number of ICT-skilled in meeting the demand of industry that is integrating ICT into their process. There are acknowledgments in computing innovation that requires various workforces of qualified systems designers, computer scientists, software developers, information professionals, information systems analysts, technology teachers, computing faculty and other computing professionals. Relating to a research on the educational opportunities for the deaf, the goals surrounding the aspects of the deaf learners' career development, research in this process and professionals training to work with the deaf and significant progress towards these goals were achieved (Beil and Panko, 1997). ICT does improve productivity as it increases activity for the deaf learners.

Since, the ICT role in teaching and learning process is very important, researchers should realized its impacts

in teaching and learning process and also in globalization (Alexandru *et al.*, 2007). Combining the availability of knowledge and information for all, globalization also acts as an important fact that is the global break of the natural and cultural borders at any time and place and this changes significantly the concept of teaching and education (Roberto, 2007). ICT tools and technologies are very crucial for the deaf learners' education. Even in a paper describing the use, challenges and issues of ICT for learning English, among the urban school students in Kuala Terengganu, Malaysia, the researchers mentioned that the ICT tools enable pupils to access, share analysis and present information gained from a variety of sources and also in many different ways (Yunus *et al.*, 2009).

ICT education is important for the deaf learners. Supported visual media aids like graphs, charts and tables are frequently used for computer education as these individuals have to depend more on vision, due to their defect of hearing (Beil and Panko, 1997). Even in operating software, the visual display plays an important role for the deaf learners as only the visual displays can help them understand a task. Multimedia technology enhances the understanding of a course lecture or a class presentation because of its visual effects for the students (Lloret *et al.*, 2009). Since, computers are adaptable to the deaf learners, computer education does fit for them, mainly for reasons like minimal supervision, enhances deaf-creativity as computers are deaf-friendly. Because these individuals' have lost their hearing senses, huge majority of them are highly skilled in visual aspects like drawing and designing. They tend to excel better in area like Web Design, Visual Arts and Animated-Graphics. For example, the multimedia purposes that were developed using Adobe Flash to attract the students' vision. In the end, the learning objective can be met when the teachers prepare the students with multimedia tools and activities in solving problems. This way, while learning, the teachers can simultaneously attract the deaf learners' interest in the learning process by using methods or devices that will attract their interest of attention. This could ease the deaf learners' understanding (Lubis *et al.*, 2009a, b). Moreover, the deaf learners can also use the online forums to discuss topics regarding the learning materials and others. Open discussions offer steady communication between individuals regarding teaching materials and others. These individuals can be between The deaf learners, academic teachers and both (Aleksic-Maslac *et al.*, 2010). This perspective is suitable for them to learn computer courses as it studies how they interact with the learning materials online.

MATERIALS AND METHODS

This study used structured interview whereby the purpose was to collect data from a number of teachers.

This was because interview questions offer a wider space for the respondents to voice-out their opinion in the extent of the questions. In this research, structured interview was chosen mainly because similar questions can be asked in the interview sessions, though to different respondents. This would generate a much more consistent yet still in the extent of the question responses; from respondents. Moreover, this study also explored the current scenarios in a particular school by understanding the relationship among the teachers with the deaf learners and the teachers' usage of computers and interests in computers, ICT and e-Learning, for the deaf learners.

This study was carried out throughout the whole of Peninsular Malaysia including Sabah and Sarawak. The location background chosen was the secondary schools executing Hearing Impaired Education Program (in specific, the levels of higher education of form 4 and 5), for the whole of Malaysia including Sabah and Sarawak. Altogether, there were twenty four schools involved being the research location which consists of 20 schools from the Peninsular of Malaysia and 4 schools from the East Malaysia (Sabah and Sarawak) that executes the Hearing-Impaired Education Program. This means that there were 24 schools that became the location of data collection.

Research instruments: For this study, the instrument of research instrument was a tool used by researcher to collect data, hence for this study, the interview protocol acted as the research instrument. Interviews were a popular research instrument among researchers and respondents because it gives information directly. This was important because interviews generated answers faster as it was conducted in a face to face manner. Interviews have given alertness towards the context by analyzing the answers given organized then interpret the data into its own context.

The interviews were formed to answer all the research questions prepared. This focus group interview had two respondent groups identified for this research, therefore researcher has formed two sets of interviews (group A and B). The usage of two different sets of interview allow researcher to obtain information from individuals of different groups. Group A consists of the teachers from the schools that have ICT courses and group B consists of the teachers from the school that does not offer ICT courses.

The interviews gave respondents a space to answer them freely. This way, the teachers could justify their opinion appropriately. The aspects of this study were analyzed in accordance with the aspects of the problem stated in this study. All the interviews mainly seek to explore on the levels of knowledge, use, satisfaction and

most importantly the interests of teachers towards the ICT education, mainly on courses like Computer Graphics, Multimedia, Web-Design, 3D-Animation for the deaf learners. Simultaneously it also focused on the exiting Computer Education Program that was already in some schools for the Hearing-Impaired Education.

Research sample, data collection and data analysis: The research sample involved in this study were the teachers teaching the deaf learners who are from the schools all throughout Malaysia including Sabah and Sarawak. The respondents of this study were divided into two groups of teachers which were from schools that offer ICT courses and schools that did not offer ICT courses.

Researcher had used the non-probability sampling to choose the teachers for interview. Through this sampling technique, respondents were chosen based on their free time and readiness to be interviewed during the time researcher is in school. Respondents' names were not requested from the school management as to facilitate randomness in the data. Thus, the sampling techniques used are more illustrated, for the reason to get an internal perspective of the teachers involved in the Hearing-Impaired Education Program, based on their experience, knowledge and opinion.

Table 1 shows the interview respondents from group A (schools that offer ICT courses) and group B (schools that do not offer ICT courses). Overall, there are 48 respondents of teachers for the interview's data collection technique as 2 teachers represented for each school (24 schools all throughout Malaysia). To breakdown according to schools, a total of 7 schools offer ICT courses and the remaining 17 schools do not have any computer courses at all offered in their schools. This is clearly shown in Table 1.

For the data collection method, 20 schools were from Peninsular Malaysia and 4 schools were from East Malaysia that was involved in the execution of the Hearing-Impaired Education Program. Data collection was done by the interviews sessions with all 48 teachers (2 from each school), after their process of teaching and learning sessions. As to avoid interfering with the teaching and learning in each school, each interview session was conducted based on the teachers' convenience. Each interview sessions was conducted in a period of 20-30 min per sessions.

Table 1: Distribution of teachers' group

Groups	Schools	Teachers	Percentage
Group A (Schools that do offer ICT courses)	7	7×2 = 14	29.2
Group B (Schools that do not offer ICT courses)	17	17×2 = 34	70.8
Total	24	48	100.0

The researcher had started the research from North part of Malaysia (Penang, Kedah and Kelantan) that was followed by the state of Perak and Kuala Terengganu. The research was then resumed at the Central part of Malaysia (the state of Selangor, Kuala Lumpur) and continued to the South part of Malaysia to Negeri Sembilan, Malacca and Johore. The last destinations were East Malaysia which are Sabah and ended with Sarawak schools. All interviews were done on weekdays and it was conducted in a period of 2-3 months.

The data of this study is a mix method of qualitative and quantitative. Thus, the answers were analyzed directly based on the respondents' answers. Overall, the interview questions have given alertness towards the context, by analyzing the answers, organized and interpreted.

RESULTS AND DISCUSSION

A total of 48 teachers teaching the deaf learners education participated in this study. From that total, 14 are male teachers (29.2%) and 34 are female teachers (70.8%). The number of teachers in this study is 48, being 2 teachers from each school and there were 24 schools involved as shown in Table 2.

For the race category, 37 teachers (77.1%) were Malay respondents, 3 teachers (6.3%) were Chinese respondents and another 8 teachers (16.6%) were from other ethnic races, like Kadazan, Iban, Bidayuh, Melanau, etc. This can be seen in Table 3.

For the state category, 8 teachers (16.7%) were respondents from Johore, 6 teachers (12.5%) were respondents from Kedah, 6 teachers (12.5%) were respondents from Perak, 6 teachers (12.5%) were respondents from Kuala Lumpur, 4 teachers (8.3%) were respondents from Sarawak and the remaining 18 teachers are 2 respondents from each states of Terengganu, Selangor, Negeri Sembilan, Malacca, Pahang, Labuan, Sabah, Penang and Kelantan with 4.16%, respectively. This is shown in Table 4.

On the interview question asked whether the deaf learners enjoy playing computer, all 48 respondents

Table 2: Teachers' distribution of genders

Gender	Frequency	Percentage
Male	14	29.2
Female	34	70.8
Total	48	100.0

Table 3: Teachers' distribution of races

Race	Frequency	Percentage
Malay	37	77.1
Chinese	3	6.3
Others	8	16.6
Total	48	100.0

Table 4: Teachers' distribution of states

States	Frequency	Percentage
Johore	8	16.70
Kedah	6	12.50
Perak	6	12.50
K.Lumpur	6	12.50
Sarawak	4	8.30
Terengganu	2	4.16
Selangor	2	4.16
N. Sembilan	2	4.16
Malacca	2	4.16
Pahang	2	4.16
Labuan	2	4.16
Sabah	2	4.16
Penang	2	4.16
Kelantan	2	4.16
Total	48	100.00

(from 24 schools of group A and B) unanimously answered Yes which generates a 100% positive answer.

Another question that gives a 100% positive answer was on the question whether the deaf learners would be interested to have various ICT courses in school (in Visual/Graphic form) whereby all 48 respondents (from 24 schools of group A and B) answered Yes unanimously.

For a specific interview question when being asked whether the respective schools offer any ICT courses, 14 teachers responded Yes (7 schools do offer, named as group A) while the remaining teachers of 34 answered No (17 schools that do not offer, named as group B). To breakdown according to schools, a total of 7 schools that do offer ICT courses in their school are Negeri Sembilan, Johore and Terengganu (which offers Computer Graphics) and the other four schools are two in Kuala Lumpur and two in Johore (which offers basic ICT literature).

The common theme of reasons given by the teachers was the limitation of course set by the Ministry of Education, Malaysia. Most teachers gave explanation that they are very much interested in teaching computer courses in school, exposing the ICT education for the deaf learners. However they couldn't as they would have to follow the time-table (subjects) schedule set by the Ministry of Education. This problem does not only affect the teachers but for the deaf learners too as the numbers of interested deaf learners in ICT education are many yet impossible to fulfill their desires.

Another common theme of problems brought up by the teachers was the inadequate computer equipment and classrooms/labs, therefore the computer courses were not offered for them to teach. For the deaf learners, infrastructure has a major role in creating comfortable learning space for them. By having adequate facilities and teaching aids, this can improve the effectiveness of learning because only then a fun/interesting environment can attract students to study. The teaching aids that the teachers used most are visual images like flash

Table 5: Teachers' interest in having CG course taught to the deaf learners

Group B	Frequency	Percentage
Yes	45	93.75
No	3	6.25
Total	48	100.00

Table 6: Teachers' insight on the deaf learners' interest in learning CG course

Group B	Frequency	Percentage
Yes	42	87.5
Maybe	6	12.5
No	0	0.0
Total	34	100.0

card, charts, objects, other reading instruments like e-Dictionary, newspapers, magazines, reference books, OHP (transparency learning-materials), LCD (Microsoft PowerPoint/Word learning-materials). Some of the respondents indicated although, a few teachers are given computers, however, there are no stable computer classes provided for the deaf learners and also multimedia infrastructure equipment is inadequate.

In Table 5 and 6, the percentage shows the views from the teachers on a certain ICT course (Computer Graphics). This interview question was asked to both group A teachers (schools that offer) and group B teachers (schools that do not offer). While Table 5 shows the result of the interview question whether the teachers are interested in having the Computer Graphics course taught to the deaf learners. Table 6 shows the result of the teachers' view on whether the deaf learners are interested in learning the Computer Graphics course.

From the total of 48 respondents (24 schools), 45 teachers answered Yes (93.75%) and 3 respondents answered No (6.25%), on the question whether the teachers are interested in having the Computer Graphics course taught to the deaf learners. This can be seen in Table 5.

In Table 6, from the total of 48 respondents (24 schools), 42 teachers answered Yes (87.5%), 6 respondents answered maybe (12.5%) and 0 respondents answered No (0%) on the question of teachers' view whether the deaf learners are interested in learning the Computer Graphics course.

Another common theme of views stated by the teachers was having these ICT courses accessible online. Overall, on the interview question on having various ICT courses available via e-Learning, 42 teachers optimistically agree that this can assist the deaf learners to access, the tutorials, notes and slides anytime, anywhere. They were determined to have their deaf learners learning them virtually.

In Table 7, based on the 48 respondents of teachers throughout Malaysia who were interviewed, 42 respondents (from 21 schools) unanimously answered

Table 7: Teachers' answers on ICT courses via e-Learning (for the deaf learners)

Groups	Answer	Percentage
Yes	42	87.5
Group A (Schools that do offer ICT courses)	10	-
Group B (Schools that do not offer ICT courses)	32	-
Maybe	6	12.5
Group A (Schools that do offer ICT courses)	2	-
Group B (Schools that do not offer ICT courses)	4	-
No	0	0.0
Total	48	100.0

Yes (87.5%) and 6 respondents (from 3 schools) answered Maybe (12.5%) and 0 respondents answered No (0%) on the question of having ICT courses via e-Learning for the deaf learners. This shows that almost around 90% of the teachers agree on the fact that the deaf learners should learn ICT courses online, compared to the 10% who disagrees. This can be seen clearly in Table 7.

Lastly, the common theme of opinions that were raised by the teachers was the various types of ICT courses offered, in particular, they prefer courses that contain more visual graphic elements for the deaf learners. On the question of which ICT courses would be highly demanded by the deaf learners, all 42 teachers unanimously answered Graphics Courses like Computer Graphics and then followed by courses like 3D-Animation, Multimedia and Web-Design. It can be seen that the deaf learners are really more interested in ICT courses which contains more visual graphics, compared to other courses. This is mainly because the teachers feel that courses that contains attractive graphics, multimedia-supported content and attractive animation and designs are more suitable for the deaf learners as these elements catch their attention/vision, compared to the plain black and white graphic-less courses.

Various answers were given more by teachers as to why the deaf learners enjoy courses that contained more graphic elements. This is because these elements surround their activities while using a computer such as Playing Games, Drawings, Watching 3D-Animation Movies and Cartoon, Internet purposes like social network of Facebook, MySpace, Twitter, chatting, article search and other Internet purposes. Since, the deaf learners' interest lean more towards the graphical elements, 42 out of 46 teachers claim that an e-Learning that offers these courses will surely attract them to learn, positively.

Combining with a very interested and committed group of teachers who are committed in teaching the deaf learners, the Computer Graphics Course could not be more interesting to learn. When being asked any other courses should be offered to the deaf learners in future, most teachers unanimously agreed in wishing to have more graphically courses like 3D-Animation, Multimedia and

Web-Design. It seems that the computer software give the deaf learners the skills to learn programs that include various aspects. The deaf learners who use embedded software will be able to improve more skills using computers. A comparison can be made by two groups which are teachers teaching software computer-based program and teachers teaching the traditional speech, in which children easily learn the syllables by following the delivery of computer based instruction.

A common recommendation was suggested by the teachers when being asked about the contents that should be included in a portal. Besides having to learn these computer courses online, the common contents requested by the respondents that should be included in a portal were having attractive visual graphics with 3D-Animation; information on the deaf, Malay Language Hand Code (Kod Tangan Bahasa Melayu), Videos showing Sign Language along with captions/subtitles, References/Tips for final exams, Job opportunities, Education institution to further studies, Blogging, Chatting System, Download/Upload Files and a Sign-Up Profile for the deaf learners, teachers and parents and a record of the deaf learners' performance.

CONCLUSION

Overall the results proved that most teachers agree that ICT courses via e-Learning should be offered to the deaf learners too. In schools, although some schools that do not have ICT courses offered to them at all; they still wish to have these courses taught in their schools. Some teachers claimed that the ICT courses are being taught for the normal-hearing students, however not for the deaf learners. An equal teaching and learning should exist for both the normal-hearing students and the deaf learners. Although, in certain classes, some teachers claim that the deaf learners are combined with the normal learners, therefore this imbalance learning affects the confidence and faith of the deaf learners. Learning ICT courses provides the deaf learners chance to be professional in the ICT era too and develop their own potentials concurrently.

ICT courses will give the deaf learners an opportunity to be professional in the ICT era too and develop their own potentials concurrently. Opportunities for teaching and learning should exist including for the deaf learners to enable them to be independent. Moreover, since the Ministry of Education Malaysia has introduced the concept Education for All, this means that equal opportunities and education services should be for every students, without judging the aspects of religion, race, sex and the individuals' difference, hence without

unbalancing the normal-hearing and the hearing-impaired as well. This concept focused on the ability, functions, skills, development, power and achievement of these students towards the Skill Development. Many opinions were raised individually by the teachers, from the interview sessions conducted. In terms of ICT education, computer courses were definitely a demanding major and this research proves that e-Learning for ICT Education was resulted in a positive form. Although, the deaf learners are prone to hearing, there are individuals who are rather inclusive by having high performance capabilities in specific fields like artistic and creativity, intellectuality and leadership aptitude or in any given academic areas (Okan and Ispinar, 2009). From the legislative point of view, inclusion is supported by incorporation of the deaf learners either directly to mainstream education or to special education, in the mainstream schools or the special schools for the deaf learners.

e-Learning creates new challenges for teaching staff, curriculum support services, disability support services and institutional administrators. Teaching staff needs to accommodate diversity within their curriculum, for example the way they design their subjects, plan the learning experiences, identify the learning materials and assess the outcomes. Moreover, teaching staff needs to develop expertise and IT skills in creating learning experiences that utilize the e-Learning technology, suitable for the deaf learners. Since, ICT is the combination of the potentials of computer, telecommunication and electronic media using the digital technology, therefore ICT has impacted positively on every aspect of human existence (UNESCO, 2005). Knowledge, tools and techniques which designate technology are very crucial in any present institution, therefore ICT should be fully-utilize in educational institutions like schools, colleges and universities for the teaching and learning processes whether to a public or private sectors. ICT education does include the deaf learners to have opportunities in the industry and research internships, bridge programs between academic levels; mentor and peer support and professional development of educators and staff.

ACKNOWLEDGEMENTS

Researchers would like to express the highest appreciation to the Ministry of Education, Malaysia and all the officers and staffs at the schools involved. High appreciation to all teachers for their full cooperation and involvement in providing information and data during this research study was conducted.

REFERENCES

- Aleksic-Maslac K., D. Vasic and M. Korican, 2010. Student learning contribution through e-learning dimension at course management information systems. WSEAS Trans. Inform. Sci. Appl., 7: 331-340.
- Alexandru, A., M. Ianculescu, M. Parvan and E. Jitaru, 2007. ICT and its impact upon the globalization and accessibility of the education in the health domain. Proceedings of the 6th WSEAS International Conference on Education and Educational Technology, November 21-23, 2007, Italy, pp: 287-291.
- Beil, H.D. and J.W. Panko, 1997. Educational opportunities for the deaf in data processing at Rochester institute of technology. ACM SIGCSE Bull., 9: 79-84.
- Boettcher, J. and R.M. Conrad, 2004. Faculty Guide for Moving Teaching and Learning to the Web. League for Innovation in the Community College, USA.
- Bolliger, D.U. and O. Wasilik, 2009. Factors influencing faculty satisfaction with online teaching and learning in higher education. Distance Educ., 30: 103-116.
- Campanella, S., G. Dimauro, A. Ferrante, D. Impedovo and S. Impedovo *et al.*, 2008. E-learning platforms in the Italian Universities: The technological solutions at the University of Bari. WSEAS Trans. Adv. Eng. Educ., 5: 12-19.
- Curtin, R., 2002. Promoting youth employment through Information and Communication Technology (ICT): Best practice example in Asia and the Pacific. Proceedings of the ILO/Japan Tripartite Regional Meeting on Youth Employment in Asia and the Pacific, February 27-March 1, 2002, Bangkok, Thailand.
- Debevc, M., P. Povalej, M. Verlic and Z. Stjepanovic, 2007. Exploring usability and accessibility of an e-learning system for improving computer literacy. Proceedings of the 1st International Conference on Information and Communication Technology and Accessibility, April 12-14, 2007, Hammamet, Tunisia, pp: 1-7.
- Din, R., M.F. Kamarulzaman, V. Dahlani, N.A. Mutalib and N.A. Johar *et al.*, 2011. Restructuring HiT factors: A measure of hybrid e-training to overcome a culture of dependence from didactic teaching. Proceedings of the 10th WSEAS International Conference on E-Activities, December 1-3, 2011, Jakarta, Indonesia.
- Drigas, A.S. and D. Kouremenos, 2005. An e-learning management system for the deaf people. WSEAS Trans. Adv. Eng. Educ., 2: 20-24.

- Huang, K., J. Smith, K. Spreen and M.F. Jones, 2008. Breaking the sound barrier: Designing an interactive tool for language acquisition in preschool deaf children. Proceedings of the 7th International Conference on Interaction Design and Children, July 11-13, 2008, Chicago, IL., USA., pp: 210-216.
- Liodakis, G., M. Kalogiannakis, M. Psarros and K. Vassilakis, 2005. Building e-services for learning and teaching by the exploitation of an LMS system. Proceedings of the 9th WSEAS International Conference on Communications, July 11-16, 2005, Athens, Greece.
- Lloret, J., M. Garcia, D. Bri and H. Coll, 2009. Using multimedia activities for homework and in-class exercises to improve the results of university students. WSEAS Trans. Adv. Eng. Educ., 1: 22-32.
- Lubis, M.A., 2009. Educational technology as a teaching aid on teaching and learning of integrated Islamic education in Brunei Darussalam. WSEAS Trans. Inform. Sci. Applied, 6: 1370-1379.
- Lubis, M.A., S.R. Ariffin, M.S. Ibrahim and T.A. Muhammad, 2009a. Teaching and learning process with intergration of ICT: A study on smart schools of Malaysia. WSEAS Trans. Inform. Sci. Applied, 6: 1380-1390.
- Lubis, M.A., M.A. Embi, M. Yunus, I.S. Wekke and N.M. Nordin, 2009b. The application of multicultural education and applying ICT on Pesantren in South Sulawesi, Indonesia. WSEAS Trans. Inform. Sci. Applied, 6: 1401-1411.
- Morrison G.S., 2004. The Early Childhood Education Today. Pearson Education, USA.
- Okan, Z. and D. Ispinar, 2009. Gifted students perceptions of learning English as a foreign language. Educ. Res. Rev., 4: 117-126.
- Roberto, R., 2007. New horizons in education and educational technology. Proceedings of 6th WSEAS International Conference on Education and Educational Technology, November 21-23, 2007, Venice, Italy.
- Sierkowski, B., 2002. Achieving web accessibility. Proceedings of 30th Annual ACM SIGUCCS Conference on User Services, November 20-23, 2002, Providence, RI., USA., pp: 288-291.
- Tarmizi, R.A., A.F.M. Ayub, K. Abu Bakar, A. Suraya and M. Yunus, 2008. Learning mathematics through utilization of technology: Use of autograph technology versus handheld graphing calculator. Proceedings of the 7th WSEAS International Conference on Education and Educational Technology, November 21-23, 2008, Venice, Italy, pp: 71-76.
- UNESCO, 2005. Information and Communication Technologies in Schools: A Handbook for Teachers, or, How ICT can Create New, Open Learning Environments. UNESCO, Paris, France, Pages: 240.
- Yunus, M., M.A. Lubis and C.P. Lin, 2009. Language learning via ICT: Uses, challenges and issues. WSEAS Trans. Inform. Sci. Applied, 6: 1453-1467.