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MULTIMEDIA BASED LEARNING MATERIALS FOR DEAF STUDENTS

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Abstract:
Deaf students have different abilities from students who have the ability to hear a lesson at school. Barriers to hear experienced by students with hearing impairment can affect the language, academic, and social skills of deaf students. Deaf students can still obtain information from other senses that are still functioning, such as the senses of sight, touch, taste and smell or of residual hearing that still exist. In the world of education, one way to overcome this obstacle is by making multimedia based learning materials which consider the principles of learning for learners with hearing impairment; a series of development of the elements of audio, visual, and digital technology to facilitate the learning activities of deaf students so that the passion, quality, and achievement of deaf students can be improved.

Keywords: deaf, learning materials, multimedia

1. Introduction

The learning process of deaf students is of course different from other regular students, for deaf students have a different way of absorbing information. Deaf students cannot receive and process the information that comes from the voice / sound. They find it difficult to communicate with other person because of the limitations of language that they have. They have difficulty in receiving information from other people or the environment and the language of deaf students are also difficult to be understood by others. Therefore, deaf students can be excluded from the life of society. Delays in

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acquiring learning information by the deaf students at school due to poor vocabulary and lesson materials that are less friendly or not in accordance with what deaf students actually need, for example there are lots of materials that are abstruse. Therefore, the learning that should be effective becomes a meaningless learning. Teachers are often less precise in using learning materials for the learning process of deaf students. Where as appropriate learning materials in learning can develop the interaction between students and teachers so that the learning becomes more meaningful.

Communication skills of deaf students, mainly students with total hearing impairment, are certainly not possible to arrive at a mastery of language through hearing, except through their vision and utilize the rest of their hearing. Therefore, deaf students use all aspects there are within them for communication. Various communication media that can be used are as follows: first, for deaf students who are able to speak, continue to use talking as a medium and read the speech as a means of acceptance from the deaf students. Second, using the medium of writing and reading as a means of acceptance. Third, using gestures. In general, the potential intelligence of deaf students is the same with students in general, but functionally the development is influenced by the level of their language skills, as well as limited information, and also the abstraction ability of the students. The effect of deafness can hamper the intelligence of deaf students.

The learning for deaf students is really not getting the attention and the decisive role from government in setting policies to provide optimal service for students with special needs. In today's digital age, there are some teachers that don't really emphasize technology as a tool that facilitates the learning process. There are many reasons behind the unwillingness of teachers to use information and communication technologies in teaching and learning. Bauer and Kenton (2005) found that teachers who are highly educated and skilled use innovative technology and advanced in overcoming obstacles, but they are not consistently good in integrating technology as a teaching and learning tool.

Based on these conditions, the students need more learning materials that are informative and can accommodate their learning style. Girgin, Kurt and Odabasi (2011) mentioned that not only teachers need to learn how to use technology, but they also need to learn how to apply the technology for teaching and learning. They need to know which technologies will be the most effective in meeting the skills, abilities and needs of students. A teacher must often collaborate with students to provide the best educational services to meet the needs of students in terms of learning.

The presentation of learning material currently is still considered as less effective to achieve the learning objectives, so it needs to be supported by learning materials designed specifically for the certain specific subjects, especially so that deaf students

can more easily understand the subject. It is need to develop multimedia-based learning materials that are developed with tutorial video. Thus deaf students will easily understand the finer points of a subject, so that deaf students can more easily formulate understanding, connect, and draw conclusions.

Multimedia learning is relevant with the learning objectives in accordance with the demands of time for developing the information and communication technology in the digital age. Therefore, the existence of a visual learning material will make it easier for deaf students in understanding the lesson. Therefore, deaf students do not experience a miscommunication between the explained material and what was envisioned.

2. Discussion

2.1 Deafness

Deaf students are students who have disorders on the ears that they cannot hear properly or even cannot hear at all, but it is believed that there is no man who cannot hear at all. Although very little, there are still remnants of hearing which can still be optimized by the deaf students. Regarding hearing impairment, especially on the definition of hearing impairment there are some definitions in accordance with the views and interests of each.

People are categorized as deaf if they are not able to hear or less able to hear sounds. Deaf students are not different from students who can hear in general physically. At the time of communicating, it is then known that students are experiencing deafness. Murni Winarsih (2007: 22) argued that hearing impairment is a general term that indicates trouble in hearing from mild to severe, categorized as the deaf and less deaf.

Students who are hard to hear have experienced delays in vocabulary a few years later of their age peers. For example, students in the eighth grade tend to function as the third or fourth grade in reading ability (Traxler, 2000). Deaf people are they who have lost the ability to hear so that it hinders the process of language learning through hearing learning, either using or not using hearing aids hearing where their limitations make it quite possible to succeed the process of language learning through hearing learning.

Some understandings and definitions of hearing impairment above are the complex definition, so it can be concluded that deaf students are students who have barriers or loss of hearing causing delays of incoming information through hearing organs. Deaf students who still have residual hearing abilities can be maximized by providing hearing aids and being given special care.

2.2 Causes of Deafness

Hearing impairment can be caused by several factors. Pre natal factors; when pregnant women (pre-natal) cannot be separated from the influence of drugs because of disease or drinking alcohol or addictive drugs that could endanger the survival of the mother and fetus so that it can affect the health and food intake for the fetus. Food for the fetus can be contaminated by substances that are harmful to the growth and development of the fetus in the womb.

At the time of birth (natal), the baby is in a state of premature that causes imperfections of organ growth when conceived by the mother so that they have physically imperfect or using wrong assistive devices in the birth process as well as delayed birth that can cause abnormalities in the hearing organ because the pressure chokes the baby's head or outer ear. Then, the last cause is the after birth (post-natal). Usually caused by an infection in hearing organs or due to an accident that can affect the inside of hearing organs. The cause of hearing impairment can be seen from where the damage occurs. For example, damage or imperfections of the shape of the outer ear, the ear is usually not perforated or blocked so that the sound cannot enter through the outer ear, whereas the outer part of ear is the first gate for a voice to enter. The imperfections can be caused by birth defects usually the ears are not yet fully formed and there is a very chronic infection in the hole or outer ear.

Damage to the inner ear type is caused by infection or damage from birth. Middle ear dysfunction can lead to information that cannot be processed and transmitted to the brain. Sensorineural damage type usually occurs because of genetic factors of parents and non-genetic factors, for example by a virus. It can be associated with one of the opinions that the cause of hearing impairment is based on several types, namely conductive and sensorineural type (Wardani, et al 2007).

Smith (2006) revealed that the causes of hearing loss are two kinds of genetic causes that are transmitted by parents to children, heredity and the cause of the environment or the experience, for example when a baby is born prematurely, the mother having measles rubella during pregnancy, viruses can cause hearing loss, for example inflammation of the lining of the brain or spinal cord, meningitis, mumps, and influenza, discrepancies Rh blood of babies and mothers who are pregnant, inflammation of the middle ear, as well as other causes such as the use of drugs, diseases of bones in the ear middle, and birth complications.

From the experts' opinion above, it can be concluded that the causes of deafness come from before birth (prenatal), at the time of birth (natal), and after birth (postnatal).

2.3 Classification of Deafness

Classification is necessary for education services for students with hearing impairment. It really determines the choice of hearing aids that fit the rest of the hearing and support the speed of effective learning. Determining the deafness and hearing aids as well as a special service will generate an optimal acceleration in perceiving the sounds of language and speech. According Boothroyd (in Murni Winarsih, 2007: 23) the classification of deafness is as follows.

a) Group I: loss of 15-30 dB, mild hearing or mild hearing impairment; the ability to capture the sound of human conversation is normal.
b) Group II: 31-60 loss, moderate hearing losses or deafness; the ability to capture the sound of human conversation is only partial.
c) Group III: 61-90 dB loss, severe hearing losses or severe hearing impairment; the ability to capture the sound of human conversation does not exist.
d) Group IV: 91-120 dB loss, profound hearing losses or very severe hearing impairment; the ability to capture the sound of human conversation does not exist at all.
e) Group V: loss of more than 120 dB, total hearing losses or total deafness; the ability to capture the sound of human conversation does not exist at all

2.4 Learning Style of Deaf Students

Basically the deaf students' learning styles emphasize on other senses that are functioning or that can still be maximized. The ability of the deaf students in language will determine the learning outcomes and processes of social interaction. Deaf students have multiple learning styles based on the capabilities and characteristics such as learning styles of visual, auditory, sign language, and total communication.

A. Visual Learning Style

Visual learning style emphasizes the use of the senses of sight for deaf students, seeing is the most dominant aspect in obtaining information. Deaf students are very difficult to define abstract learning materials. If this situation is allowed, it will lead to misconceptions. Making learning materials that have many portions of visual aspects can strengthen the concept and meaning.

B. Auditorial Learning Style

The residual hearing, of deaf students who still have residual hearing, should be maximized. They should be trained continually as much as possible to have a more sensitive hearing. If a hearing aid is often used, the deaf students will become more

sensitive in responding information. Deaf students who still have residual hearing can use hearing aid in order to maximize the potential of their hearing.

C. Learning Style using Sign Language

Deaf students without residual hearing can use sign language to communicate with other students and teachers. The essence of sign language is the same with other languages, namely communication with the speaker, to exchange information.

D. Total Communication Learning Style

Basically, the use total communication in learning is the use of various means of communication to make deaf students easier in receiving information. That is, students are given the broadest rights to communicate, include hearing, seeing, speaking, reading, finger spelling, and gesture. Andreas Dwijosumarto (1996: 167) summarized some definitions of total communication from some experts, among others Denton (1970):

> *"Total communication includes the use of one mode or all the way communication system which uses gestures, finger spelling, speech, speech reading, amplification, gestures, pantomimic, drawing, writing and the use of residual hearing according to the needs and abilities of individuals".*

Learning to use total communication using various means of communication so as to enable complete communication and can narrow the misinterpretation that may occur due to miscommunication between teachers and deaf students. Thus, it can be concluded that the actual total communication is a communication concepts using a variety of media, ways to facilitate communication for deaf students.

According to Andreas Dwijosumarto (1996: 168), he revealed the driving factors of the development of total communication, namely:

a) dissatisfaction with educational results obtained through methods that have been revealed through various studies;
b) research on the manual use of components in communicating with deaf students are not detrimental to their use;
c) the results of the study of sign language which change the people's views of sign language;
d) increasing awareness of the majority (hearing people) to appreciate the sincerity of minority groups (deaf);
e) the increasing knowledge of the first phases of the development of the language of hearing students and language of the deaf students.

3. The Development of Multimedia Based Learning Materials

The presence of technology in education is basically intended to facilitate students in learning. Principles of technology when integrated with the principles of education will result in something that can help the efficiency in terms of learning. Morrison and Lowther (2010) revealed that "education technology is not a homogeneous intervention but a wide range of modalities, tools, and strategies for learning effectiveness, therefore, depends on how well it helps teachers and students to achieve instructional goals desired.

The presence of multimedia technology should be utilized as much as possible for education, in particular those that can be applied in special schools, because the learning in special schools requires a lot of engineering and the use of technology in order to help the learning process for students. This is because students have different learning styles from regular students in public schools. The current educational paradigm has shifted from teacher-centered learning to the opposite now. Currently, there is a tendency for student-centered learning (Jonassen, 2000). Students need learning materials in accordance with their needs, abilities and characteristics, therefore the technology and learning materials are engineered in such a way so that it is accessible with the students' characteristics and assist students in independent learning.

Good learning materials are learning materials that can be used based on the demands of time. Learning materials are always evolving and adapting to the demands of the curriculum, students' needs and students' characteristics. Multimedia learning materials need to pay attention to avoid sentences or anything abstract. The immensity of the materials on each learning videos must be observed so that the scope of the materials presented are not too much, too little or too complicated so as to achieve the desired competencies.

In studying the learning material to achieve a competency, teachers need to see the readiness of deaf students in terms of the modalities of learning materials. Identifying early ability of deaf students related to difficulties experienced previously, deaf students who do not have sufficient knowledge or deaf students who have the ability to quickly understand the learning materials. It is important to be done by the teacher so that the sufficient knowledge can be used or support to learn new teaching materials. For example, to learn how the breeding of living things, then the student should learn the names and characteristics of living things. To determine whether students have sufficient modalities of learning materials, then the teacher must give the prerequisite test. If known student does not have enough knowledge to learn new learning materials, the teachers will give the debriefing (matriculation), using the previous learning materials.

4. Multimedia in the Learning of Deaf Students

One reason that underlies the making of multimedia-based learning materials is to improve the learning result of deaf students. Learning materials are arranged in such a way to help students to achieve competency and the need to face the global. Learning with different learning materials from the usual that is used by teachers can make learning process more fun.

Multimedia commonly known today is a wide variety of combinations of graphics, text, sound, video, and animation. This incorporation is an entity that is jointly presenting information, the message or content of the subjects (Arsyad, 2010: 171). Almost the same as described above, (Winarno, 2009) revealed that the multimedia components are marked with the presentation of text, images, sound, animation, and video. These components, organized into an integrated program. Based on the above understanding, it can be concluded that multimedia is the incorporation of elements of audio, visual, text, animation integrative designed to create dynamic presentations.

Mayer (2005) *one of the principles of cognitive theory of multimedia learning is to support the human brain to create a reasonable mental representation from the learning material. The human brain's task is to perceive the new material as an active participant, and eventually build new knowledge*. Multimedia-based learning materials will have an impact on students' active cognitive and learning. Clark & Mayer (2011) revealed "*Multimedia presentations can encourage learners to engage in active learning by mentally representing the material in words and in pictures and by mentally making connections between the pictorial and verbal representations*".

Multimedia Utilization in Learning for students includes:

A. Multimedia as learning presentations.

Multimedia presentation is used to describe materials that are theoretical and have a purpose to visualize the material with the projector. Presentations in learning are a learning method, as well as a lecture. But with presentations, teaching materials presented can be more complex because the content can be in the form of audio, visual and text. The use of multimedia in this presentation has provided an enormous influence, for example by presenting, teachers are easier in conveying materials, learning materials can be prepared in advance in the form of softfile;

B. Multimedia as simulation tools.

Some learning requires real experience so that students will be able to understand the material provided better. There are some learning materials that cannot be presented as real, but can be simulated through multimedia, for example learning about solar system. With the help of multimedia devices and software, students can learn through simulation of *stelarium* software for solar system learning materials. Here is an

important role of multimedia in learning; multimedia can simulate some learning materials that are difficult or even impossible to do in conventional learning;

C. Multimedia learning video

Video learning is a merger between the video and learning materials. Video is created using video editing software. Content in learning videos can also be made as attractive as possible, and most importantly be able to bring a new experience that is relevant to learning materials in accordance with the basic competencies. Learning video can also enrich the exposure as a material integrated with other media such as text, pictures or animations.

One of the most cherished material applied to language learning and teaching is, of course, video. Canning-Wilson (2000) revealed that students like to learn the language through the use of video, which is often used for something very significant and different in language teaching. The existence of a video in the learning enables communication in learning. Video is a form of communication and can be accessed without the help of language, because we often interact with gestures, eye contact and facial expressions to convey meaning.

The learning process for deaf students as much as possible takes advantage of software and multimedia tools that can help students' understanding. Learning materials that include animation and video clips into learning requires more effort to locate and include the type of material (not to mention the effort involved in creating animation and video), studies show that these materials have a strong impact on student learning (Mayer & Moreno, 2002). In lessons, some materials require information that is more than just oral or written, so with multimedia, especially video learning, material can be presented more complexly by the use of images, animation or video illustrations, sign language video as interpreters of the learning materials into the sign language conversation, writing / text describing the material and the sound output is intended for deaf students who still have residual hearing.

5. Conclusion

Learning using multimedia helps teachers to make the atmosphere becomes interesting and fun, because the learning material, which is packaged in the form of animation, is more lively, easy to understand and clear so that the deaf students can easily understand the learning material. Multimedia-based learning material is packaged in a more vibrant form and can simulate the learning material to be more attractive so as to make the deaf students grasp and understand the material that is being taught to them. Therefore, multimedia-based learning materials for students with hearing impairment are very effective to be applied in education. Support from the government and the

parties concerned is needed to support and disseminate this program to schools that support the education of deaf students to use multimedia teaching materials to improve the quality of learning for deaf students to be better, to reach a brilliant future.

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