

ELECTRONIC SIGNING STORYBOOK (CODREAD) FOR DEAF STUDENTS

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It was well documented that deaf children are often delayed in language development compared to their hearing counterparts. The delay unfortunately hampered the cognitive development and affected the learning process among deaf students. Realizing the importance of grasping basic language skills among deaf children, this paper reports on an ongoing development of electronic signing storybook; a CALL (Computer-Assisted Language Learning) prototype aimed at enhancing the deaf students' language and literacy skills, specifically vocabulary learning. This paper is segmented into two sections; a theoretical framework that guided the project and preliminary research of the study and findings from preliminary needs analysis research. Learning theories which involved Behaviourism, Cognitivism, and the ARCS model are reviewed along with the Dialogic Reading method to conclusively form a theoretical framework for this study. Since the study is still in the initial stage, preliminary research is carried out qualitatively, including the interviews with respondents. It is concluded that both learning theories provided broad potential for student-centred learning process and are capable of expanding the language capacity of the students. Preliminary study showed deaf students' levels and approaches to reading and writing are different from that of their normal counterparts; thus more deaf-friendly CALL is needed in Malaysia. Several assistive technology adaptations with regard to the needs of deaf students in planning the CALL prototype are deliberately discussed for future researchers and practitioners.

Keywords: Electronic signing storybook, computer-assisted language learning, deaf students

Normal children develop most of their early linguistic skills through spoken language and they use what they hear to construct their own understanding; which includes the decoding of the words, rules governing the sentences and combining words to make meaningful sentences (Beaty & Pratt, 2007; Ormrod, 2006). Construction of understanding tremendously influences and helps children later in their development of written language; a secondary form of literacy that revolves around understanding of printed texts and capability to produce written

texts (Kajder, 2007). Deaf children, however, are disadvantaged on both counts because of their inaccessibility to spoken language and less exposure to the sign languages (Belson, 2003; Goldin -Meadow & Mayberry, 2001). Not surprisingly, then, deaf children are often delayed in language development compared to their hearing peers (Daigle & Armand, 2007; Kyle & Harris, 2006; Mayer, 2007; Wauters, 2006).

Geers (1994) further added that the disparity between their incomplete spoken language system and demands of reading a speech-based system is the culprit that resulted in the low literacy levels among students with hearing disabilities. Language deficit in an early onset of linguistic acquisition will be clearly evidenced in middle-school where the written language is widely being used (Stoner et al., 2005).

Advancing learning process demands highly rich literacy situations in which reading and writing play a bigger role in acquiring broader knowledge. Entering this phase, students should be able “to read in order to learn”. In a congruent view, Piaget (1964) cited by Passig and Eden (2000), suggested that lack of linguistic progression hampered the cognitive development among deaf children; thus affecting their chances to be functional members of society (i.e., the capability to enquire knowledge, to be employed and to be able to communicate with the community) (Bond et al., 1994; Bowe, 2002; Bursuck & Damer, 2007; Gunning, 2003; Ormrod, 2006).

For normal children, vocabulary development is highly related to their communicative input and their environments (Carney & Moeller, 1998; Ormrod, 2006; Schunk, 2004; Silverman, 2005). Vocabulary knowledge provides the foundation to decode and comprehend text and deficit in this area will clearly interrupt the process of become a mature reader (Beatty & Pratt, 2007; Bursuck & Damer, 2007; Nagy, Berninger, & Abbott, 2006). Moeller et al. (1986) found a lack of improvement in deaf students’ language skills with age, with a delay in vocabulary development at 4-9 years compared to hearing children. Thus, limited or no access to the oral language potentially hinders the process of vocabulary development in deaf student’s linguistic milestone.

Computer-Based Dialogic Reading (Codread): A Conceptual Framework

In addressing the issue, the researcher decided to built a prototype named “Computer-Based Dialogic Reading (CODRead)” which involved adapting the traditional dialogic reading method into the digital version. CODRead is an electronic signing book with a diffusion of drill and practice and problem solving elements. Adapting the conventional method into the pixel screen requires a solid framework comprising dialogic reading method and several theories including theories of learning, motivation, language and instructional design. The next subtopic will discuss on method and the afore-mentioned theories in detail.

Instructional Design: Application of ADDIE Model

ADDIE Model is a generic instructional design providing an adaptable framework in any condition to optimize effectiveness of the learning processes. The model is widely used and regarded as one of the best models in development of multimedia software (Siemen, 2002). According to Seels and Glasgow (1998), this model supported the learner-centred teaching and learning practices thus enabling learners to own their learning. ADDIE consists of five phases; Analysis, Design, Development, Implementation and Evaluation. Each of the phases has the output which automatically becomes an input for the next phase. Reiser and Dempsey (2002) stated that the phases are rotated and repeated (Figure 1).

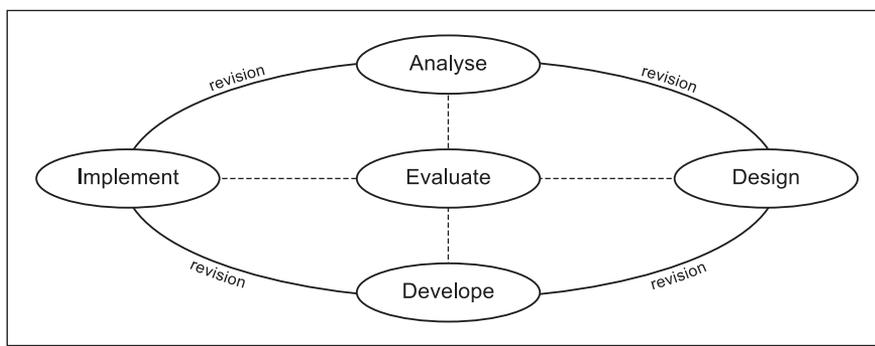


Figure 1. ADDIE Model (Reiser & Dempsey, 2002)

What is Dialogic Reading Method?

Dialogic Reading is a research-based technique invented by Whitehurst and his colleagues during the 1980s at the State University of New York at Stony Brook Reading and Language Project with the ultimate goal of enriching the vocabulary of children (Arnold, 2005). It is an interactive shared picture book reading practice designed to enhance young children's language and literacy skills. Vygotsky's Zone of Proximal Development and scaffolding concept are applied in this intervention (Vygotsky, 1978); which are evidenced during the shared reading practice. The adult and the child switch roles so that the child learns to become the storyteller with the assistance of the adult, who functions as an active listener and questioner. Three simple steps are involved in the process; a) asking "wh-" questions that have specific answer, b) increasing open-ended questions and c) expanding appropriately on the children's attempt to answer those questions (Whitehurst et al., 1988; Zevenbergen & Whitehurst, 2003). For adult as a facilitator, DR prompts (i.e CROWD, PEER) are prepared to help them memorize the DR strategies that should be used during the process of intervention (see Table 1).

Table 1
DR Prompts (WWC Intervention Report, 2006)

Prompts	Description
Completion	child fills in blank at the end of a sentence
Recall	adult asks questions about a book the child has read.
Open-ended	adult encourages child to tell what is happening in a picture.
Wh-	adult asks “wh-” questions about the pictures in books.
Distancing	adult relates pictures and words in the book to children’s own experiences outside of the book.

Theories of Learning Application: Behaviourism and Cognitivism

CODRead is an electronic book infused with drill and practice and problem solving. Drill and practice is widely affected by the ideas from behaviourists. Skinner (1954) argued in his paper, the use of “machine and electrical devices” in education provided the optimal condition for learning. He further stated the use of machine and electrical devices will tremendously lift the time used in drill and practice, provide precise and immediate reinforcements to the students’ answers and cater to the individual learning needs of each student. Instead of focusing time on those practices, the teachers may use the time to create more creative learning where teacher-student interaction is more needed. Behaviourism emphasizes immediately observable, behavioural changes in performance as indicators of learning (Roblyer & Edwards, 2000). It concentrates on observable behaviour rather than inner mental experiences (Whelan, 2005). Behaviourism focuses on a new behavioural patterns being repeated until they become automatic based on observable changes in behaviour (Mergel, 1998). Levy (1997) further added that at an early age, children’s capability to memorize the pattern of the language and vocabulary is important in building the solid foundation of the language itself before applying the foundation to more complex idea construction. This prototype manifested the implementation of behaviourism by providing instant feedback and reinforcement for each stimulus suggested. Besides, the focus on learners’ need analysis which considered the learner’s characteristic is another form of behaviourism’s prominent reflection: human’s needs.

Information processing theory consists of three main components, which are sensory memory, short-term memory (STM) and long-term memory (LTM). Sensory memory is a part of memory that receives all the information a person senses; short-term memory also known as working memory, stores information temporarily immediately after we receive some new information, until the information is either lost or placed into long-term memory that has an unlimited capacity and can hold information indefinitely. Firstly, humans get information

from environment via receptors (eyes, ears, nose, mouth and/or hand); that information will be held in the short-term memory for a very short time; if we pay attention to that information, the brain will encode the messages for storage in the long term memory. Otherwise we will lose that information and forget it. Even if we have transferred the information to long-term memory, unless we recall it rapidly, it will get forgotten. The Information Processing Model is shown in Figure 2.

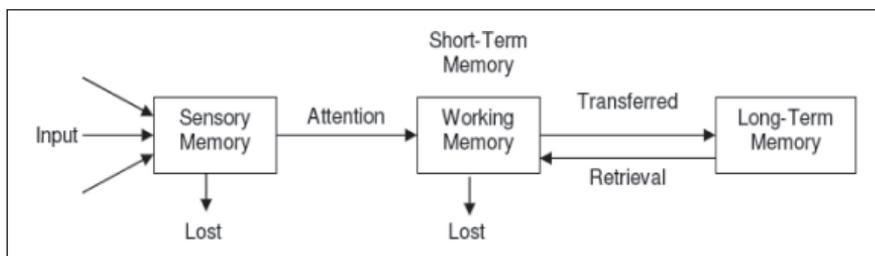


Figure 2. The information processing model (Tan & Wong, 2003, p. 80)

The implementation of cognitive theory in the prototype involved the repetition of object's name each time the user clicks on it. During this action, the STM will be stimulated. And for the LTM, the content of the prototype will be related to the real life situation. Besides, the idea of organizer by Ausubel is implemented by categorizing the objects/words into certain characteristics. For example, the concept of child is related with the users themselves, brothers and sisters.

Linguistic Model: Ahmad Model

According to Levy (1997), CALL may be defined as '*the search for and study of applications of the computer in language learning and teaching*'. He stated that CALL is used as a general term to cover all the roles of computer in language learning. He also stated CALL is not specifically harnessed into one discipline, yet it is shaped by interdisciplinary field which included artificial intelligence, instructional design, educational technology and others. Thus, there is no definite conceptual or theoretical framework that CALL practitioners have to adhere to. However, Ahmad et al. (1985) cited in Levy (1997) proposed a model of CALL with respect to the main factors in CALL which comprise learner, technology and language. The model did not enter the role of the teacher with the exception of cases where ergonomic consideration is needed. The teacher may have some control in assisting the learner in handling the technology. The Ahmad Model emphasises the role of technology in learning and the primary goal is to set the computer as a helpful tutor.

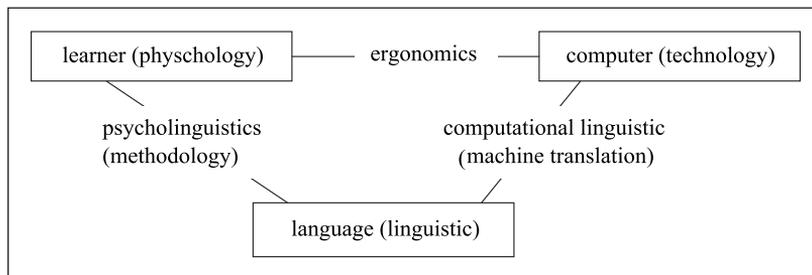


Figure 3. The Ahmad model

Application of ARCS

Motivation played a big role in learning process among children with disabilities (Jamila K. A. Mohamed, 2007). According to Suppiah et al. (2008) motivation is regarded as an effort to fulfil a requirement or need. They further added that with motivation, an individual will be attracted to the activities that filled the needs. The ARCS model was developed by Keller (1987) specifically for educational purpose. This model consisted of four elements, namely: Attention, Relevance, Confidence and Satisfaction.

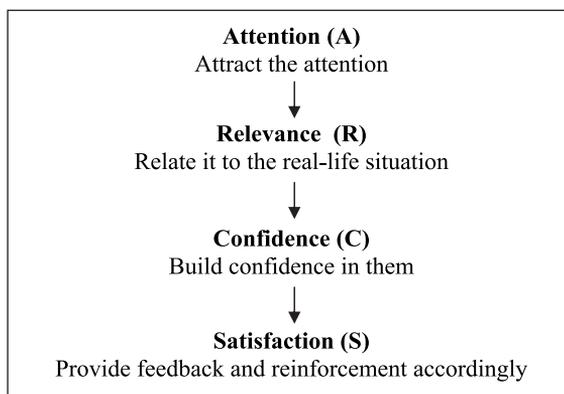


Figure 4. ARCS Model (Jonassen in Bushro, 2008)

PRELIMINARY FINDINGS

Three open-ended interviews were conducted to understand the needs and problems faced by the deaf students. This procedure is important to analyse the preferences of the deaf students in their attempt and approach to learn language and use the technology-based learning offered. Respondent 1 (R1) is an

experienced teacher who taught in a deaf school in Kuala Lumpur for 14 years. The notion that stated the deaf students are weak in language is supported through the interview. R1 informed that “...younger deaf students are weak on language, especially on phonology and word recognition. Different from their younger peers, the older deaf students have difficulty in writing a sentence. They tend to write a short sentence and resulting in a short essay. They also have grammar and comprehension problems, especially on the usage of suffixes such as ‘di’, ‘mem’ and ‘yang’. That were among the reasons they flunked their examination. Mostly, their language development is lagged 1.5-2 years from the hearing person”.

The report is consistent with the statement by Respondent 2 (R2) , a mother to a 10-year-old deaf student in Selangor “ *My son is unable to sign the objects and spell it. He knows A, B, C...but when asked how to sign a chair, he didn't know how to do it.*” Both R1 and R2 also stated the low retention of word recognition on deaf children and the inability to understand the word in terms of form.

When asking on the suitable approach for teaching language to the deaf students, R1 reported “...pictorial-supported material is really helpful. Besides, unconventional teaching such as group book-reading and games are helpful and attract them more than syllabus-based learning. However, currently, there is no storybook that embedded the sign-language which defers their motivation to read on their own.” Concurrently, R2 stated “*My son is a reluctant reader. He does not like reading since he does not know how to do it. However, I encourage him by reading for him a big pictorial storybook. He seems to enjoy the picture and easily relating the pictures with the words read.*”

Respondent 3 (R3), a 10-year-old deaf student, was interviewed with the help of a translator. When asked on whether he enjoys learning language in school, R3 responded “*No. I don't like. I don't understand.*” When the researcher handed a storybook with a picture and a workbook to learn language, he chose the storybook. When asked why, R3 said, “*I love (pointing to the picture). It (refers to the character of the fish) doing something (bringing a gift). And ... this (refers to the character of the crab) enjoy it.*” On why he did not choose the workbook , R3 stated “...*(pointing to the picture) is not beautiful.*”

Attempting the next construct on how the computer-based technology helps the deaf students, R1 said “...*computer really helps. Deaf people master the computer skill.*” She later continued “*the sign-language video embedded makes them more interested to learn. Compared to material without sign-language video, they tend to get bored easily.*” R2 reported “*Computer such as software with sign-language on it really really helps them ... and also the parents. Moreover, they tend to enjoy the visual offered by it (software).*” R3 echoed the same sentiment towards technology usage. The researcher showed him a website with a sign-language attached and when asked whether he likes it, R3 responded by nodding his head. The researcher later asked why he likes it and R3 responded “*fun...*” and later showed a thumbs-up.

DISCUSSION

Preliminary findings from the interviews attempted to answer questions on the construct of language, preferences on teaching and learning of language and also the possibility of computer-based instruction being used in language learning among deaf students. The data showed congruent views with numerous reviewed international literature (Daigle & Armand, 2007; Kyle & Harris, 2006; Mayer, 2007; Wauters, 2006). Malaysian deaf students do have linguistic weakness resulting from the inability to grasp the elements of language skills; this research clearly showed their weakness in phonology, word recognition and syntax. These three constructs unfortunately dominated the first to third tier of language development (Beaty & Pratt, 2007) which were pre-requisites for higher level language development.

The respondents shared similarity in preference for the learning approach, where the unconventional style which is less rigid and structured provides a more interesting environment for the teaching and learning process. Reading pictorial storybook is their preferred way of language learning since it enables the deaf students to be involved with the storyline given and the visuals embedded. The use of pictures in language learning among deaf students has been supported by the statements from two deaf adults; Jessica Mak (personal communication, May 31, 2009) and Ho Koon Wei (personal communication, May 31, 2009). The visual should be interesting and the conveyed story and action must be able to speak for themselves to attract deaf students. All respondents reported that computers tremendously help the learning process not just for the deaf students but also the hearing parents and family members. The main possibility is that CALL provides a more interesting and constructive environment.

CONCLUSION

Integration of technology in language learning among deaf students is promising. However, careful planning involving the need analysis of the learner and solid conceptual framework does help the instructors in their teaching and learning processes. Specific software catering to the needs of this low-incident disability community is highly needed so that they will be able to reap the benefit of technology in education.

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