ABSTRACT

Literacy is the ability to read and write. Being able to read and write is an important skill in modern society. Deaf and hard of hearing (D/HH) students' literacy achievement has been reported as lower than that of hearing students. This research focuses on the literacy skills of D/HH students, aiming to determine their reading/writing skills and propose a theoretical framework that can enhance and improve these skills. This paper provides an introduction on D/HH education, including tools and challenges, an analysis of existing literature related to D/HH education applications, and sign language (SL) applications. The advances that are needed to further improve the effectiveness and efficiency of present reading and writing teaching techniques are further discussed, and a comparative survey conducted in this area is provided. The study explores the significance of Visual Phonics for D/HH as a motivating force for research in reading and writing taxonomies. The objective of this study is to propose a theoretical framework that can enhance and improve D/HH reading and writing skills.

Keywords: Deaf and Hard of Hearing (D/HH), Literacy, Sign Language Applications, Visual Phonics

1. INTRODUCTION

The deaf and hard of hearing (D/HH) are made up of a unique community of people with their own language and culture. Individuals within this group share some specific features, which make them different from people who can hear. Conducting a study in this area is indeed worthwhile. The education of students categorized under the D/HH group is essential to the remedial education field. The field of D/HH studies is typically defined as the study of sign language (SL), where the history, literature, community, and culture of deaf people are examined by

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considering the sociological, anthropological, and ethnographic perspectives (Cripps and Cooper, 2012; Marschark and Humphries, 2010), D/HH students’ literacy achievement has been reported as considerably lower than that of hearing students. Therefore, many studies have investigated the issues related to learning to read or write of D/HH children.

Extended literature has revealed that no direct link exists between SL and the technical code used in reading and written form (Glaser and van Pletzen, 2012). According to Bianchini et al. (2012) and María et al. (2010), evidence of the relationship between SL competence and reading level is increasing, and interest in fostering the use of SL in teaching writing to D/HH people is increasing. However, they are not certain yet which specific mechanism enables deaf people to attain a good command of written language, based on their knowledge of sign language. In addition, the structure of SL is deeply different from the sequential frame of a written or spoken language due to the use of multi-linear aspects. Therefore, the D/HH student has to ‘recode’ the interpreter’s (signer) signs and concepts and terminology used in teaching, leading the interpreter to not only use mouthing and finger spelling, but also to create ‘conceptually-based signs’ (Bianchini et al., 2012).

Other researchers claimed that D/HH graduates from secondary schools lack sufficient written language skills, especially in relation to syntax. They also stated that even deaf adults face the same problem, regardless of their level of education. A major problem encountered is that D/HH students miss important information during presentations because they have to watch either the interpreter/instructor or the projected slide (Belsis et al., 2012; Hadjikakou, 2005). In summary, D/HH students have problems with text-based skills, such as word identification (Wauters et al., 2006), vocabulary (Marschark et al., 2002), and morph syntax, and with reader-based skills, such as working memory (Kelly and Mousley, 2001). Therefore, the literature demonstrates the weaknesses of D/HH children in many skills that are required for reading and writing capability (Hermans et al., 2008).

A sector of the population that has consistently experienced challenges in achieving reading proficiency is D/HH students, even though most have average or above-average intelligence (Maller and Braden, 2010). Over the past 90 years, studies have stated that most D/HH students complete their educational programs without being able to read well (Luckner, 2013). The lack of literacy skill development may likely be the primary factor that causes 58,500 D/HH individuals in the United States to enroll in the Supplemental Security Income program (Social Security Administration, 2011; (Luckner, 2013). Improving the literacy of D/HH students reduces their dependence on others for interpretation of written text (Hoorn, 2009).

Is improving the literacy of D/HH students via technology possible? How existing devices or applications assist D/HH people to bridge the communication gap between D/HH and hearing people is difficult to identify (Ahmed and Seong, 2006). A survey conducted by the author indicates that learning applications are very important in the teaching sector. In addition, learning application tools motivate, encourage, increase flexibility, help D/HH students become independent, save costs, and provide interactive and meaningful learning. Moreover, the survey shows that using SL for teaching D/HH students provides a higher level of communication than when the spoken language is used. Therefore, using SL learning application tools for D/HH students can enhance their reading and writing capabilities (Abdulghafoor et al., 2015).

This paper aims to study D/HH education, identify teaching tools, identify challenges, investigate the existing approaches in D/HH literacy, identify gaps, and propose a theoretical framework for an application that enhances and improves D/HH students’ reading and writing skill levels by using the Visual Phonics (VP) technique. The rest of the paper is organized as follows: Section 2 describes the research methodology. Section 3 provides a brief introduction on D/HH education, tools, and challenges. In Section 4, the related works and literature on sign language applications are reviewed, and the gap is identified. In Section 5, the applications of VP are reviewed. The proposed framework
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