Impact of interactive reading intervention on vocabulary development of Deaf and Hard of Hearing Students at Wangsel Institute of the Deaf

Abstract

Learning English as a second language is challenging for Deaf and Hard of Hearing (DHH) students at Wangsel Institute for the Deaf. One of the most important components for improving English language is vocabulary knowledge. Vocabulary is fundamental for communicating, reading, thinking, and learning. This action research aims at examining the effectiveness of the use of pictures in teaching English vocabulary to DHH students at Wangsel Institute. The research also examined the effective strategies to teach vocabulary to DHH students. A pre-intervention interview was conducted to ask about students' experience in learning English. A total of thirty students participated in the study. They were provided intervention for this action research for a period of over two months with focus on teaching targeted words using pictures. The participants' understanding of the targeted words were assessed and analysed using pre-intervention and post-intervention vocabulary tests. It was found that all the participants had improved scores during the post-intervention vocabulary test compared to pre-intervention vocabulary test. The finding of the study indicated that the use of pictures to teach English vocabulary to DHH students was effective. It also calls for teachers of the Deaf to use pictures to enhance the effectiveness of the teaching and learning of English vocabulary for DHH students.

Keywords: Pictures, vocabulary, Deaf and Hard of Hearing, key stage, teaching strategy.

Introduction

Learning English is vital because it has become a global language that is used by almost all communities as a second language (Al-Sobhi & Preece, 2018). It is also one of the two official languages in Bhutan. Despite challenges in learning English, studying the language is worthwhile because it has become foundational in almost all areas of life, including technology, science, education, politics, economics, commerce, and communication (Oder &Eisenschmidt, 2018). Bhutan has also adopted English as the medium of instruction to teach all subjects in schools. As a result, studying English has been made a requirement in all levels of education including at Wangsel Institute for the Deaf. Currently, there are 112 students with DHH enrolled in the Institute. Teaching and learning English as a second language to and for DHH students is a challenging task for both the teachers and the students. Deaf students are found to have poorer language capacity than their hearing peers (Khasawnah, 2021). According to Khasawnah (2018), learning English for DHH students is not the same as learning English for hearing students. DHH students are found to often show severe delays in phoneme development, vocabulary and syntax (Adi et al., 2017). As a result, according to Dewi, et al., (2019), Deaf students need a different form of language development approach compared to hearing students.

This study was conducted to address one of the challenges that the DHH students encounter in learning English, which is the development of vocabulary. Encouraging vocabulary knowledge is highlighted as a key component of any effective literacy programme (Graves, 2016). According to Birinci and Saricoban (2021), lack of vocabulary is more prominent in DHH individuals compared to individuals without DHH owing to their disability. Therefore, prioritizing teaching vocabulary to the DHH when teaching English as a foreign language by language teachers is crucial. The action researchers proposed the use of pictures to teach English vocabulary to DHH students. Ntinda et al., (2019) stated that Deaf students are naturally visual

learners. The goal of this study was to investigate if the use of pictures to teach English vocabulary to DHH students was effective in the Bhutanese context.

Research Question

What is the impact of the use of pictures in teaching English vocabulary to Deaf and Hard-of-hearing students?'

Aims and Objectives

1. To find out if students' English vocabulary knowledge matches their grade level aligning with the existing National English Curriculum Framework.
2. To investigate the effectiveness of pictures in teaching vocabulary to DHH for each Key Stage level.
3. To investigate which strategy helps DHH students to better remember how to spell words.

Deafness and Language Learning

Language and literacy development are important aspects of early childhood development that impact an individual's adult life at a later stage (Luckner & Cooke, 2010; Nutbrown, 2011). It entails interpersonal communication skills as well as the ability to read and write. Cawthon (2001) states that low academic achievement, reading and writing challenges in the classroom are all linked to language delays. Children who are Deaf, when admitted in Wangsel Institute come without language or few natural home signs (Choden et. al., 2022). Luckner and Cooke (2010) claim that children who are DHH demonstrate limited vocabulary knowledge because of the delay in language acquisition. Moreover, to cope with language teaching and learning, it is essential to understand the vocabulary knowledge of DHH students. DHH students in Wangsel Institute require adequate support when learning a language, whether it is sign language or written English. Lederberg et al. (2012) claim that children who are DHH have little or no access

to oral phonological representations of written and spoken words, and that their use of sign language does not correspond to written language in the same way that spoken phonemes do. Consequently, DHH children frequently require assistance or guidance from teachers in order to expand their written language vocabulary. With the advancement of amplification technology, a few studies indicated that some children who are DHH using Cochlear Implants (CI) have increased vocabulary knowledge proportionate to their hearing peers due to improved access to spoken language which, however, a later meta-analysis research conducted found DHH children with CI to still have diminished vocabulary (Trussell et. al 2017). Currently, such technology is unavailable in Bhutan.

Vocabulary Teaching and Learning

Language acquisition becomes extremely difficult without a robust vocabulary base. Knowledge of both grammar and vocabulary is required for people who are Deaf to communicate through written English and adequately use comprehension of the English language while learning other subjects. Diamond and Gutlohn (2006) define vocabulary as the knowledge of words and word meanings and further explain that vocabulary knowledge is something that expands over the passing of a lifetime. According to Luckner and Cooke (2010), vocabulary is a crucial part of language development skills such as reading comprehension, cognitive ability, and learning literacy for information acquisition. Vocabulary is one of the most important skills essential to develop when learning English. Language micro-skills emerge from it. Limited vocabulary knowledge affects the progression in subsystems of language such as syntactic and pragmatic understandings. It is found that DHH students at Wangsel Institute lack vocabulary knowledge in personal communication with teachers, which impedes them from learning written English. It is claimed that a limited vocabulary has a negative impact on literacy skills (Graves, 2016; Kirsch,

2016; Quigley, 2018). As a result, the gap in comprehending intervention strategies is significant for the teachers of DHH students.

Vocabulary Teaching Strategies

There are several strategies whereby teachers use visual aids. Making use of pictures to teach vocabulary using visual aids can be extremely helpful to the Deaf, but they must be prepared and used properly (Barnes et al., 2020). Trussell and Easterbrook (2013) and Tammy (2016) claim that DHH students whose mode of communication is through sign language could build vocabulary through picture storybook teaching strategies or using pictures that form a book for the targeted words. Additionally, Coigley (2008) states that interactive visual storytelling can cultivate group participation, group work engagement, and vocabulary learning.

There are a variety of inclusive teaching strategies that can help all students learn vocabulary, however, Graves (2016) and Kirsch, (2016) claim that only a few specific strategies including techniques of repetition and review, displaying of fascinating words, word webs and walls, creation of extensive learning experiences for the students, and storytelling are effective for DHH students. Trussell et. al (2017) argue that there are no specific vocabulary instruction strategies for DHH children, which may be because of the lack of replication of studies. On the contrary, Gonzalez (2010), and Trussell and Easterbrook (2013) claim that stories provide supporting framework for language-learning which can assist in promoting the acquisition of vocabulary and grammatical structures. Trussell and Easterbrook (2013) added that children who are DHH are deprived of incidental vocabulary learning, which hearing peers mostly learn incidentally, and require vocabulary intervention in which storybook reading intervention is an effective strategy.

Teaching vocabulary to students who are DHH is not without challenges. Teaching vocabulary not only encompasses teaching the meaning of words but its spellings as well. Guzin et al. (2016) state that vocabulary knowledge forms the basis of reading comprehension. Therefore, investigating and grasping the success of one method over another is required as it has been discovered that a limited vocabulary has an adverse impact on literacy (Graves, 2016; Kirsch, 2016; Quigley, 2018) which impacts their learning progress.

Teaching Vocabulary through Pictures

Currently, teaching English language is challenging for teachers at Wangsel Institute. In addition, the students do not have access to early intervention services in speech and language development. This has resulted in educators exploring other alternative strategies to teach English Language that best suit the needs of DHH students. One of those alternative strategies is the use of pictures. Birinci (2014) investigated the effect of visual materials on Deaf students' vocabulary acquisition. She found that visual materials led to more effective vocabulary retention in the immediate and delayed post-tests than use of just sign language, which lacks visual support. This suggests that visual materials may be benefitted from when Deaf students are taught English**.**

Research conducted by Birinci and Saricoban (2021) to explore to what extent using visual materials together with the sign language is beneficial in teaching vocabulary to Deaf students who learn English as a foreign language, found that using visual materials with sign language as a medium of instruction is beneficial in teaching vocabulary to Deaf students in learning English as a foreign language. A study conducted by Gonzalez-Reyes, Acevedo, Inostraza and Strickland (2021) also showed that the DHH students' perspectives on the use of visual aids was positive. This may be because children who are DHH are visual perceptual

learners. Consequently, assuming its effectiveness, teacher researchers at Wangsel Institute for the Deaf are proposing an intervention strategy to teach English vocabulary using pictures to teach English vocabulary.

Method

By the first week of July, they implemented the intervention in their respective classes until the beginning of September. The intervention strategy included story-telling using pictures to teach the targeted vocabularies. By the end of the second week of September, another test of the targeted words was conducted for participants from each Key Stage. Then the data collected was analysed. To see whether there was improvement in learning English vocabularies for the participants, a comparative analysis of pre-intervention and post-intervention data was carried out by us. Creswell (2012) reports that in order to obtain correct information during the data collection process, it is important that participants cooperate. Therefore, before the start of the pre-intervention phase, participants were informed about their right to agree to or refuse to take part in this study. All of the participants agreed to be involved in this study and signed a letter of consent permitting the use of their data and pictures for the purpose of report writing. The action researcher ensured all necessary permissions were sought from the participants and other relevant stakeholders.

Sampling

Thirty participants, voluntarily participated in this study from classes III, VI, VII and X under the Key Stages I, II, III and IV respectively. Both classes III and VI consisted of 8 participants each, whereas classes VII and X consisted of 7 participants each. Participants were selected randomly, and those who volunteered to participate in the research were chosen. In total, there were 14 male and 16 female participants in this study.

Data Collection Tools

Action research, according to Baum (2006), can be a basis for knowing and that experiential learning can lead to a meaningful form of knowledge that influences practice. Action research is a systematic method of inquiry that aims to change one's own actions, the environment, or both (Grundy 1995; Stringer 2004; Sherab, 2013). Therefore, with the aim of enhancing learning, the action researchers have used action research to conduct this study in order to better understand how their students learn best. Additionally, because of its unique epistemology, action research as a method offers an inclusive, practice-enhancing strategy for developing educational theory (Robertson, 2000). For the purpose of this study, they made use of a mixed-mode (qualitative and quantitative) approach to collect data.

Vocabulary Test and Interview

A vocabulary test was conducted with a diverse set of students across all the four Key Stages. Vocabulary test was carried out with individual students before and after the intervention to find out the immediate results of the DHH students. Interviews were conducted to collect baseline data along with a photovoice to understand the student's level of vocabulary knowledge before the intervention and their comprehension skills of the vocabulary after the intervention. The interview questions, which were related to the research questions, also included ‘how effective was the strategy in retaining vocabulary’.

Data Processing and Analysis

The action researchers maintained anecdotal records, carried out video recordings, and used photo voice as sources of evidence. Multiple sources of data were collected, corroborating the data for reliability and validity. Through the use of a mixed-mode approach for data collection,

they hope to gain insight and clarity into DHH students' English vocabulary knowledge and the effective use of pictures in teaching English vocabulary to DHH students.

The data collected was analysed by comparing pre and post-intervention test scores of the targeted 50 words followed by thematically analysing the interview data and documented data. Braun and Clarke (2006) define thematic analysis as "a strategy for identifying, analyzing, and reporting patterns (themes) within data." (p. 89). By carefully analyzing and identifying counterpoints from the literature and other sources, this study also addressed the competing plausible explanations in order to strengthen its conclusions and increase its reliability.

Baseline Data

The pre-intervention data for this study include an interview and a vocabulary test conducted for all the participants from Key Stages I - IV. The findings from the interviews and vocabulary test are discussed below.

Interview Results

During the interview, a total of 8 questions were asked to all the participants, except for Key Stage I, for the purpose of collecting data (see Figure 1). The action researchers could not conduct interviews for Key Stage I participants as they provided mismatched answers or no answer at all due to some possible reasons such as their Bhutanese Sign Language (BhSL) competency or interviewers not meeting their needs when expressing in BhSL. However, from the other responses of the participants collected, two following themes emerged surrounding which further discussions are based.

Figure 1

Conducting Pre-intervention Interviews with Key Stage I -IV Students

Students' Experiences in Learning English

During the interview, the majority of the participants expressed liking English. Participant, P16 from Key Stage II, shared about enjoying framing sentences and learning new stories. Another participant, P7 from Key Stage IV, said about liking learning English because it is important for life. The participant further explained that English would enable communication with the hearing community in the future. From the few that expressed not liking English, participant P14 from Key Stage III shared that it was because of difficulty in understanding new words. Meanwhile, participant P20 from Key Stage II shared that he/she did not like the subject because English grammar was difficult to understand.

When the participants were asked about the difficulty of learning English, most participants responded by saying that they found it to be of moderate difficulty. Participant, P13 from Key Stage III, shared that he/she found English to be neither difficult nor easy and further elaborated that when teachers explained the meaning of new words, he/she found English easier to study. Participant, P5 from Key Stage IV, said that he/she found studying English both easy and difficult at the same time. From the participants who responded that studying English was difficult, P21 from Key Stage II, attributed that to difficulty in understanding the grammatical

rules. Meanwhile, participant P6 from Key Stage I, responded by saying that learning English was easy.

Teaching and Learning Strategies

During the interview, participants were also asked about teaching strategies they found to be the most effective to teach vocabulary, and about their personal vocabulary learning strategies. Regarding learning strategies, participants were asked which strategy they found the most effective when remembering how to spell new words they learned. To this question, the majority of the participants responded by saying that they remembered the spelling of a word best when they practiced writing down the word and followed it by fingerspelling the learned word. Participant, P15 from Key Stage II, shared that he/she learned the spellings of words by writing them down while the participants, P8 from Key Stage III and P3 from Key Stage IV, shared that they practiced how to spell words through fingerspelling.

Regarding teaching strategies, the majority of the participants responded that they understood best when teachers made use of visual aids such as pictures and videos when explaining the meanings of words. Participant, P11 from Key Stage III, expressed that the use of pictures and videos help them with comprehension of word meanings. A few participants also shared that the effective use of facial expressions when explaining the meaning of words helped them understand better. Additionally, P3 from Key Stage IV shared that use of facial expressions and body gestures (non-manual features) while explaining the meaning of words helped improve his/her understanding of words during English classes. Another participant from Key Stage II, P21, shared that he/she understood more when the teacher made use of a projector to show pictures and videos when explaining the meaning of words.

Vocabulary Test Results

A total of 40 grade-appropriate words for Key Stage I and 50 for Key Stages II-IV were selected from the prescribed English National School Curriculum for the vocabulary test. The tests were given in a one-on-one setting, and each time a word was correctly signed along with an example, indicating the understanding of the meaning, a tick was put next to it (see Figure 2). A cross was placed next to the words if students provided incorrect or no responses.

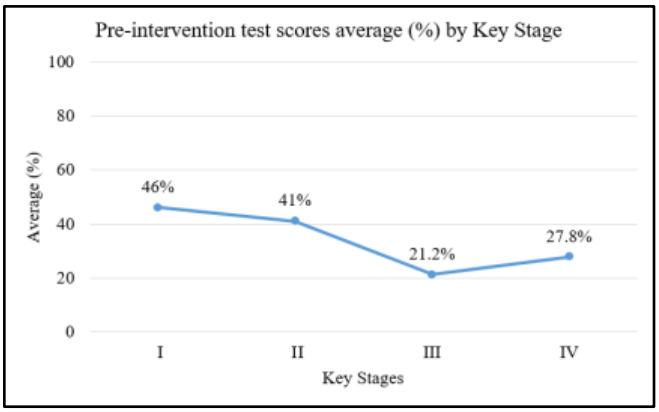
Figure 2

Conducting Pre-intervention Vocabulary Test

A total of 30 students participated in the study from Key Stages I, II, III, and IV. During the pre-intervention vocabulary test, participants from Key Stage I had the highest test scores of average with46% while participants from Key Stage III had the lowest test scores of average with 21.2%.

Figure 3

Pre-intervention Test Scores Average for Key Stages I - IV



Key Stage I

A total of 8 students from Key Stage I, participated during the pre-intervention vocabulary test. From the 8 participants, P29 had the highest score of 28 points out of 40, while P25 scored the lowest with 1 point out of 40 during the pre-intervention vocabulary test. From the total participants, 50% (number (n)=4) scored above 20 points while the remaining 50% (n=4) scored below 20. Findings from the pre-intervention vocabulary test results for this Key Stage show that male participants had a higher mean score (*M=23*) compared to female participants (*M=15.6*). Participants from Key Stage I had an overall mean score of 18.4. The pre-test scores are provided in Table 1 and the scores disaggregated by gender are provided in Table 2.

Key Stage II

A total of 8 students from Key Stage II participated during the pre-intervention vocabulary test. From the 8 participants, P15 had the highest score with 43 points out of a total of 50 while P19 scored the lowest with 5 points out of 50 during the pre-intervention vocabulary test. From the total participants, 37.5% (n=3) scored above 50% (25 points) of the total score while the remaining 62.5% (n=5) scored below 50%. Findings from the pre-intervention vocabulary test results for this Key Stage show that male participants had a higher mean score (*M=23.7*)

compared to female participants (*M=18.6*). Participants from Key Stage II had an overall mean score of 20.5.

Key Stage III

A total of 7 students from Key Stage III participated during the pre-intervention vocabulary test. From the 7 participants, P13 had the highest score with 32 points out of a total of 50 while P11 scored the lowest with 0 points out of 50 during the pre-intervention vocabulary test. From the total participants, 14.3% (n=1) scored above 50% (25 points) of the total score while the remaining 85.7% (n=6) scored below 50%. Findings from the pre-intervention vocabulary test results for this Key Stage show that male participants had a higher mean score (*M=11*) compared to female participants (*M=10.3*). Participants from Key Stage III had an overall mean score of 10.6.

Key Stage IV

A total of 7 students from Key Stage IV participated during the pre-intervention vocabulary test. From the 7 participants, P7 had the highest score with 24.5 points out of a total of 50 while P4 scored the lowest with 1.5 points out of 50 during the pre-intervention vocabulary test. All of the participants scored below 50% (25 points) of the total score. Findings from the pre-intervention vocabulary test results (see Figure 11) for this Key Stage show that female participants had a higher mean score (*M=14.3*) compared to male participants (*M=13.7*). Participants from Key Stage IV had an overall mean score of 13.9.

Intervention Strategy

A total of 40 grade-appropriate words for Key Stage I and 50 words for Key Stages II - IV were selected. The targeted words were selected from the texts in the prescribed English National School Curriculum framework. The list of selected words was from the lessons taught to the

students without the use of pictures. The targeted words consisted of nouns, adjectives, adverbs and verbs. After the selection of the words, the action researchers started developing materials for the intervention. The materials developed consisted of pictures of targeted words and picture books for the stories selected for the purpose of this research (see Figure 4).

Figure 4

Word Bank Developed for Intervention Strategy

Only pictures that portrayed and linked to the meaning of words clearly were selected. The action researchers started teaching the targeted words to four grade levels (III, VI, VII, X) selected from each of the four Key Stages using the teaching materials developed. The intervention strategy was implemented during the 3 periods allocated for English subject every week for a period of 2 months (8 weeks). The researchers were given the freedom to choose their lesson to teach the targeted words using the pictures. The pictures of the targeted words were shown along with its sign, and for words without the sign pictures and examples were provided (see Figure 5). A pre-intervention interview was also conducted to supplement the baseline data collected through vocabulary tests.

Figure 5

Post-Intervention Data

A total of 30 students participated during the post-intervention vocabulary test from Key Stages I, II, III, and IV. During the post-intervention vocabulary test, participants from Key Stage II had the highest test scores with an average of 86% while participants from Key Stage I had the lowest test scores average with 64%.

Key Stage I

Of the 8 participants from Key Stage I, P26 had the highest scores with 37 points out of a total of 40 while participants P25 and P30 scored the lowest with 10 points out of 40. From the total participants, 75% (n=6) scored above 50% (20 points) of the total score while the remaining 25% (n=2) scored below 50%. Findings from the post-intervention vocabulary test results for this Key Stage show that male participants had a higher mean score (*M=34.7*) compared to female participants (*M=20.2*). Participants from Key Stage I had an overall mean score of 25.6.

Key Stage II

Of the 8 participants from Key Stage II, P15 and P16 had the highest scores with 50 points out of a total of 50 while participant P19 scored the lowest with 31 points out of 50. All the participants scored above 50% (25 points) of the total score. Findings from the post-intervention vocabulary test results for this Key Stage show that female participants had a higher mean score

(*M=43.2*) compared to male participants (*M=42.7*). Participants from Key Stage II had an overall mean score of 43.

Key Stage III

Of the 7 participants from Key Stage III, P8 had the highest score with 49 points out of a total of 50 while participant P14 scored the lowest with 4 points out of 50. From the total participants, 85.7% (n=6) scored above 50% (25 points) of the total score while the remaining 14.3% (n=1) scored below 50%. Findings from the post-intervention vocabulary test results for this Key Stage show that female participants had a higher mean score (*M=40*) compared to male participants (*M=27.3*). Participants from Key Stage III had an overall mean score of 34.6.

Key Stage IV

Of the 7 participants from Key Stage IV, P7 had the highest score with 49.5 points out of a total of 50 while participant P4 scored the lowest with 6 points out of 50. From the total participants, 71.4% (n=5) scored above 50% (25 points) of the total score while the remaining 28.6% (n=2) scored below 50%.Findings from the post-intervention vocabulary test results for this Key Stage show that female participants had a higher mean score (*M=42.3*) compared to male participants (*M=32.4*). Participants from Key Stage IV had an overall mean score of 35.2.

Table 1

Pre and post intervention test scores

Key Stage I			*Key Stage II*			*Key Stage III*			*Key Stage IV*		
Part	*Pre*	*Post*	*Part*	*Pre*	*Post*	*Part*	*Pre*	*Post*	*Part*	*Pre*	*Post*
P23	27	28	P15	43	50	P8	20	49	P1	23	26.5
P24	18	32	P16	36	50	P9	13	46	P2	2	15.5
P25	1	10	P17	20	46	P10	3	35	P3	19	46
P26	27	37	P18	7	43	P11	0	39	P4	1.5	6
P27	17	23	P19	5	31	P12	5	30	P5	23	48
P28	24	35	P20	30	47	P13	32	48	P6	4	35
P29	28	30	P21	9	39	P14	1	4	P7	24.5	49.5
P30	5	10	P22	14	38						

Table 2

Pre and post intervention scores disaggregated by gender

	Key Stage I		*Key Stage II*		*Key Stage III*		*Key Stage IV*	
	Pre	*Post*	*Pre*	*Post*	*Pre*	*Post*	*Pre*	*Post*
Male	23	34.7	23.7	42.7	11	27.3	13.7	32.4
Female	15.6	20.2	18.6	43.2	10.3	40	14.3	42.3
Overall	18.4	25.6	20.5	43	10.6	34.6	13.9	35.2

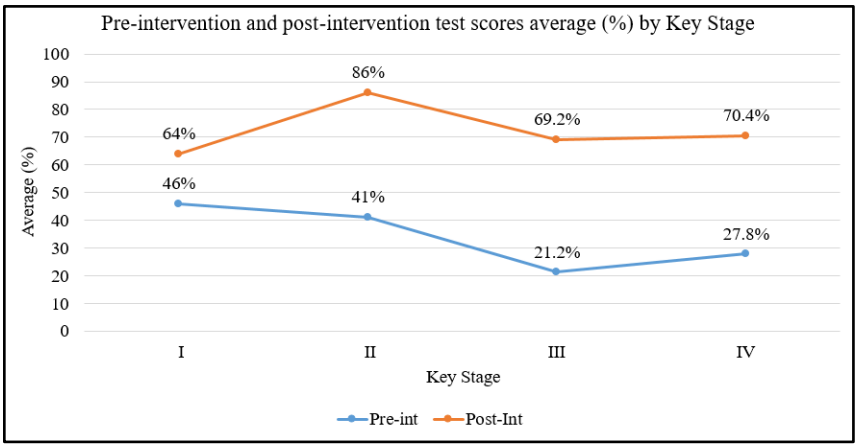
Analysis of Pre-intervention (baseline) and Post-intervention Data

Pre-intervention and post-intervention data were collected from participants on how they perceived the word by reading it and expressing its meaning. The data were analysed to determine the changes in accuracy. We felt adequately competent to assess the student's level of performance before and after intervention because the testing was just at the single-word level of 50 signed word knowledge and usage. Multiple sources of data like interviewing the participants before the intervention, and maintaining anecdotal records of participants' responses were maintained for data corroboration and to heighten the research validity.

A comparison of pre-intervention and post-intervention test-scores average for Key Stages I - IV showed an increase in test scores average for all four Key Stages (see Figure 6) during post-intervention test. The lowest increase in test scores average was observed in Key Stage I from 46% to 64% marking an increase in test scores average by 18% during the post-intervention test while the highest increase was observed in Key Stage III from 21.2% to 69.2% marking an increase in test scores average by 48% during the post-intervention test.

Figure 6

Pre-intervention and Post-intervention Test Scores Average (%) by Key Stage

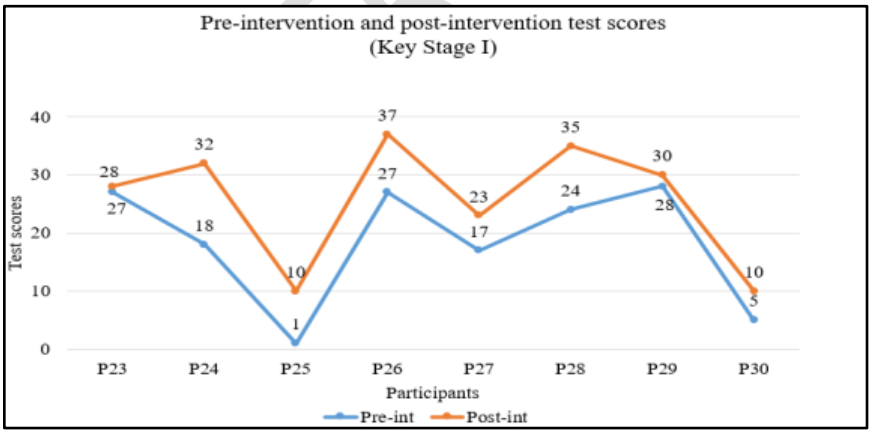


Key Stage I

A comparison of pre-intervention and post-intervention vocabulary test scores for Key Stage I showed an increase among all 8 participants in test scores (see Figure 7). The lowest increase in test scores was observed in participant P23 from 27 points to 28 marking an increase by 1 point during the post-intervention test while the highest increase was observed in participant P24 from 18 points to 32 marking an increase by 14 points during the post-intervention test.

Figure 7

Comparison between Pre-intervention and Post-intervention Test Scores

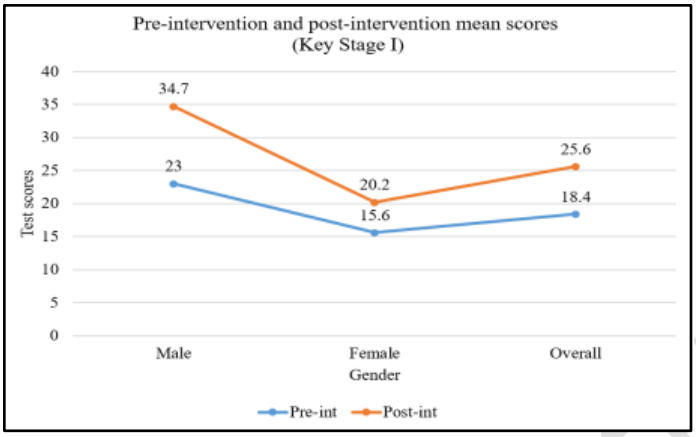


While comparing pre-intervention and post-intervention test scores, an increase in mean score by 7.2 points has been observed from the previous mean score of 18.4 during pre-intervention test to 25.6 during post-intervention test (Figure 8). The mean score for female

participants increased from 15.6 to 20.2 marking an increase by 4.6 points during the post-intervention test while for male participants the mean score increased from 23 to 34.7 marking an increase by 11.7 points during the post-intervention test.

Figure 8

Comparison between Pre-intervention and Post-intervention Mean Scores

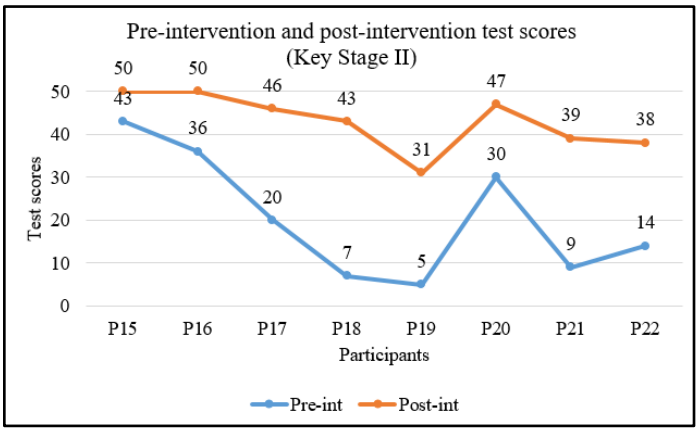


Key Stage II

A comparison of pre-intervention and post-intervention vocabulary test scores for Key Stage II showed an increase among all 8 participants in test scores (see Figure 9). The lowest increase in test scores was observed in participant P15 from 43 points to 50 marking an increase by 7 points during the post-intervention test while the highest increase was observed in participant P18 from 7 points to 43 marking an increase by 36 points during the post-intervention test.

Figure 9

Comparison between Pre-intervention and Post-intervention Test Scores



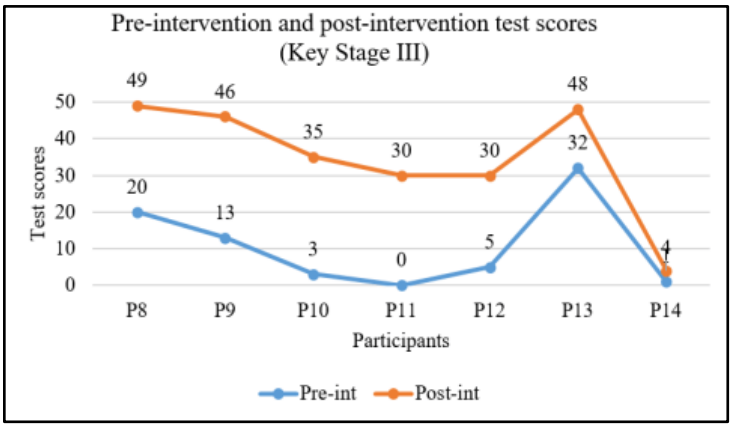
While comparing pre-intervention and post-intervention test scores, an increase in mean score by 22.5 points has been observed from the previous mean score of 20.5 during pre-intervention test to 34.6 during post-intervention test. The mean score for female participants increased from 18.6 to 43.2 marking an increase by 24.6 points during the post-intervention test while for male participants the mean score increased from 23.7 to 42.7 marking an increase by 19 points during the post-intervention test.

Key Stage III

A comparison of pre-intervention and post-intervention vocabulary test scores for Key Stage III showed an increase among all 7 participants in test scores (see Figure 10). The lowest increase in test scores was observed in participant P14 from 1 point to 4 marking an increase by 3 points during the post-intervention test while the highest increase was observed in participant P9 from 13 points to 46 marking an increase by 33 points during the post-intervention test.

Figure 10

Comparison between Pre-intervention and Post-intervention Test Scores



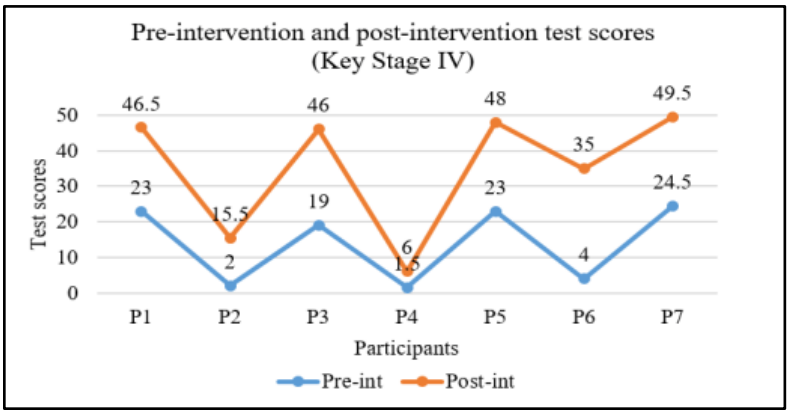
While comparing pre-intervention and post-intervention test scores, an increase in mean score by 24 points has been observed from the previous mean score of 10.6 during pre-intervention test to 34.6 during post-intervention test. The mean score for female participants increased from 10.3 to 40 marking an increase by 29.7 points during the post-intervention test while for male participants the mean score increased from 11 to 27.3 marking an increase by 16.3 points during the post-intervention test.

Key Stage IV

A comparison of pre-intervention and post-intervention vocabulary test scores for Key Stage IV showed an increase among all 7 participants in test scores (see Figure 11). The lowest increase in test scores was observed in participant P4 from 1.5 points to 6 marking an increase in test scores by 4.5 points during the post-intervention test while the highest increase was observed in participant P6 from 4 points to 35 marking an increase by 31 points during the post-intervention test.

Figure 11

Comparison between Pre-intervention and Post-intervention Test Scores



While comparing pre-intervention and post-intervention test scores, an increase in mean score by 21.3 points has been observed from the previous mean score of 13.9 during pre-intervention test to 35.2 during post-intervention test. The mean score for female participants increased from 14.3 to 42.3 marking an increase by 28 points during the post-intervention test while for male participants the mean score increased from 13.7 to 32.4 marking an increase by 18.7 points during the post-intervention test.

Findings and discussions

The purpose of this action research was to examine the effectiveness of the use of pictures to teach English vocabulary to DHH students. The following are the key findings from the action research that was carried out:

a. Low vocabulary knowledge

DHH students typically do not reach the age-appropriate levels set as their hearing peers because of the delay in their first language acquisition, which also causes them to have limited lexicons and learn a new language more slowly (Lederberg& Spencer, 2001; Luckner & Cooke, 2010). DHH students in Wangsel are found to have delayed first language acquisition which has caused DHH to have a limited lexicon. Therefore, the findings from this action research with data collected from the pre-intervention vocabulary test indicate that vocabulary knowledge of DHH students for each Key Stage did not match their grade level. Participants had a lower

vocabulary knowledge than what was required by the existing National English Curriculum Framework.

b. Improvement in vocabulary knowledge and retention after the use of pictures while teaching English vocabulary to DHH

The findings of this study show that as the action researchers adapted and incorporated visual aids, particularly the use of pictures, while teaching English vocabulary to DHH students, test results and student feedback on learning vocabulary improved. This is in line with the findings of another study conducted by Gentry et al., (2004) on effectiveness of multimedia reading materials on children who are Deaf where use of pictures along with text when presenting stories resulted in improved comprehension of words in the story compared to use of only text for DHH students. As the action researchers carried out the intervention strategy using pictures to teach vocabulary to the students, the findings from the post-intervention data showed an increase in the test scores of all of the participants.

Findings from students' responses to being asked which teaching strategy they found most effective when learning the meaning of a new English word during the interview also indicated use of pictures as the most effective strategy for teaching English vocabulary. In line with this finding, Adi et al., (2017) in an earlier study on teaching English lessons to Deaf students recommended use of pictures of words and use of sign language while teaching English. The results of this action research corroborated the findings of other previous studies that visual aids, and more specifically, use of pictures helped enhance students while recalling lexical items (Luckner& Cooke, 2010; González-Reyes, 2021).

c. Fingerspelling as an effective strategy to remember how to spell words

Another key finding from this study was that use of fingerspelling positively impacted the participants' ability to recall and remember new words that were taught. During an interview conducted for the pre-intervention phase, the participants of this study were asked about a strategy they found to be most effective when learning to remember spellings of new words they learned. To this question, the majority of the participants responded by naming fingerspelling as the method which helped them improve their ability to correctly spell words they learned.

Educational Implications of the Findings

The findings of this study suggest positive implications for teaching English vocabulary to DHH students in Bhutan with the following suggestions:

a. Implication for schools/institutes for the Deaf

Teaching vocabulary through the use of pictures such as picture books, flashcards and picture story books strategy seems effective to teach children who are DHH according to the findings of the research. Therefore, vocabulary knowledge being the building block of syntactic and pragmatic language development, the use of this strategy is highly recommended. This, not only could develop children's expressive and receptive language skills but also could improve their literacy skills and thus, academic performance.

b. Implication for Special Educational Needs (SEN) schools with Deaf students

Assuming the visual nature of learning of students who are DHH, this strategy of using pictures to teach vocabulary is also expected applicable to children who are DHH enrolled in SEN schools. However, the medium of instruction through BhSL used during the research for

DHH children may have assisted in understanding and better performance. Even without considering this medium of instruction, it is still believed that this strategy can be applicable and effective for those children in SEN schools in Bhutan.

c. Publication of target word picture books for the Deaf students

Picture books with targeted words are deemed necessary for DHH children who are lagging behind in vocabulary acquisition compared to their hearing peers. As suggested by this research findings, it is recommended that picture books with targeted words be published so that it can be efficacious in teaching vocabularies. This would not only save time for teachers in teaching vocabulary but can also be used as a resource for students to read and learn independently for vocabulary development. Therefore, it is highly recommended that the level-wise targeted word picture books for DHH students be published and made available in Bhutan. The publication may be from the individual writers and illustrators or by the government bodies such as the Department of Curriculum and Professional Development (DCPD).

d. Picture-based textbooks and workbooks

Since this research is based on the use of pictures to teach vocabulary, it may also suggest the use of picture-based textbooks and workbooks for DHH children. In this way, they may get clues from the pictures to learn vocabulary. This may also be convenient for teachers to teach vocabulary as well as other subsystems of language and literacy. Consequently, the work burden for teachers may be reduced and the motivation and encouragement in literacy learning in DHH students may be instilled.

Limitations of the Study

As with the majority of studies, the current study was subjected to limitations as well. One of the limitations of the current study was the sample of this study. The population for this study was derived from four different classes out of twelve in the institute covering only a few sections of the students. Thus, the findings of this study may not generalize to all DHH students.

Other limitations of this study also include the lack of inclusion of a comparison or the control group. Additionally, the possibility of variables like repetition, the participants' level of hearing, use of technology, assistive devices like hearing aids, Bhutanese sign language (BhSL) as a medium of instruction, and examples to teach the vocabulary may also have affected the findings of the study. Another limitation of the current study may be the lack of similar research conducted in the field of deafness in Bhutan in the past to compare the current findings.

Conclusion

Learning English has gained great importance for everyone to communicate effectively in today's world. However, it is a challenge for many including DHH students. Studies have shown that teaching vocabulary is one of the most crucial elements in language learning. Even with regard to DHH students, lack of vocabulary is prominent because they are not able to acquire all the components of a language. Pre-intervention data shows that DHH students' vocabulary knowledge did not commensurate the expected levels of competency standards put forth by the curriculum framework.

This research found evidences that using pictures and finger spelling of words improved DHH students' vocabulary acquisition. Teaching English vocabulary using pictures showed positive results for DHH students with students scoring high in vocabulary tests after the implementation of intervention strategy. Despite its limitations, the findings of the current study

provide the teachers of DHH with an insight into how to help DHH students improve their English vocabulary.

Consent

As per international standards or university standards, respondents' written consent has been collected and preserved by the author(s).

Recommendations for Future Research

A replication of this study is recommended for future researchers. A more comprehensive statistical analysis is required to determine if the findings are statistically significant. A different group of participants from all the other classes is also recommended to be included. Future researchers are recommended to take into consideration other variables mentioned in the limitations. The role of gender in the performance of male and female participants is also another interesting finding which can be explored in future research. The involvement of other teachers from different classes and in different subject areas are also encouraged for better management of time and resources. It is expected that the findings of this study will motivate teachers working with DHH students to use visual aids like pictures to enhance teaching and learning process and that it will also serve as a foundation upon which other studies in the field of Deaf Education will be carried out.

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