The Effect of Computerized Glossary Instructional Program on Deaf Students' Learning English Language Vocabulary and Their Retention in Jordan

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Abstract In Jordan, deaf learners suffer from great weakness in English language; this is attributed to using the traditional method for implementing modern or more active methods. Therefore, this study aimed at looking into the effect of a computerized glossary instructional program on deaf students to learn English language vocabulary skills and their retention in Jordan. The two questions of the study were: Are there any statistically significant differences at (α=0.05) in student’s vocabulary skills that are attributed to the teaching strategy? Are there statistically differences in deaf students’ retention of the new vocabulary items attributed to the teaching strategy? The design of the research is quasi-experimental with an experimental group and a control group. Pre-post test was used to collect the data. The delayed is used to measure students' retention. The participants of the study were male and female students from Al Amal School for deaf students in Irbid city. They were randomly divided into a control group (21 students) and an experimental group (22 students). The results of the study showed that the computerized glossary had a significant effect on deaf students' vocabulary skills as well their retention. Thus, the deaf students had the ability to remember the computerized glossary through spelling the new words, reading them, and remembering their meanings in Arabic through using the sign language. In light of the results, it is recommended to integrate the computerized glossary to deaf students in the Jordanian EFL curriculum for teaching English language and vocabulary skills.

Keywords Computerized Glossary Strategy, Students Retention, Vocabulary Skills

1. Introduction

There are different methods in which deaf students can learn and teachers can use to teach them. [1] stated that deaf students can use manual alphabets. When they use fingerspelling, they can represent the written letters and words directly by drawing the letters and spell them. In addition, finger spelling is defined as a method that deaf people can use to communicate with others by using their fingers to make shapes to represent the alphabetical representations of the language. In most cases, deaf people use it for the proper names, terms, and as a second choice after the sign language, especially when they do not find a sign language equivalent for the terms or words.

In most cases, language development of deaf learners is delayed and relies on their understanding of the visual input and its effect on their ability to communicate [2].
Thus, the deaf children acquire the source language SL as their first language to convey the meaning. They also acquire the SL before their peers acquire the first words of the spoken language. Moreover, deaf children who are born for deaf parents can learn sign language before those who were born for hearing parents. That is because deaf parents expose their children to the sign language. Deaf parents have already experienced the difficulties that their children will have and they knew how to overcome the challenges of their disability of hearing [3]. Deaf students are identified as students with hearing loss or who do not use their sense of hearing to learn and listen to others. Therefore, in most cases their linguistic status cannot be changed [4]. Then, since they cannot hear, deaf students rely on other senses to learn and acquire the language.

Vocabulary is recognized as the primary foundation for teaching any language and it is considered as the integral aspect of understanding the language and there is little to express without vocabulary. Therefore, vocabulary learning is considered as the most important stage of language learning, because when the learners have more words, they will be able to use the language effectively [5]. Language vocabulary is also known as a collection of words that individuals use to communicate and understand effectively [6].

[7] The visual style that is used in the learning process by deaf students and this is their success when learning the language. Researchers also added that visual materials mean materials that physically present language and knowledge by the use of signs, photographs, finger spelling, machines, posters, films, slides, and all other helpful visual methods. In the same field, [8] mentioned that deaf learners use visual images when they learn a language. In a late stage of learning the language, there is a stage of total communication approach which is described by [9] as a combination of different methods used by deaf people to learn and to communicate with others. Signs, finger spelling, reading of the mouth and facial expressions that are mixed during the conversation or learning process are the methods that can be used.

Deaf learners view sign language as their mother tongue language and when they acquire another language it will be known as their second language [10]. Therefore, deaf students can acquire English language as the second language. Vocabulary learning is the most important part of language learning. [11] Learning vocabulary is a significant part of the teaching process. [12] Mentioned that learners need to learn vocabulary to be able to use the language and to express them in a way that other people can understand them correctly. [13] Highlighted that deaf students must learn vocabulary items effectively. In addition, vocabulary items are known to be the blocks for learning any language, and without using them effectively, one cannot learn the language, and the use of language depends on the use of vocabulary [14].

The deaf student teacher should use computers and technologies as useful teaching tools. [15] Indicated that the integration of a computer program in pedagogy as a technological tool when adopted by teachers makes them more comfortable during the process of teaching a language. They added that curriculum targets could be achieved by using different programming tools to facilitate the process of language teaching and learning for teachers and students in different educational stages. In the same field, [16] highlighted that learners can get the help of knowing the meaning of new words and understand the text without any interruption.

[17] emphasized that mastering his/her language skills, which are listening, speaking, reading, and writing, which all depend on vocabulary items, is an important part of language acquisition. It is necessary, then to know and understand the words of the language. Vocabulary is also the most critical aspect of understanding any language [18].

**The statement of the problem:**

Being teachers for deaf students for more than four years, the researchers have noticed that deaf students face difficulties in vocabulary learning classes. The students' difficulties might be due to teaching strategies. Their major problem is so apparent when learning new items. As [19] stated that many of deaf students tend to depend on Arabic language instead of improving their skills in English. The researchers have noticed that little research has been conducted in Jordan on using computerized glossary in teaching EFL deaf students. The researchers believe that the role of technology can be maximized in order to improve students’ vocabulary recognition to enhance their overall language achievement.

Therefore, the researchers suggested using an instructional program based on a computerized glossary as a tool for deaf students’ learning vocabulary and enhancing their retention. Using technology can have an active role in developing the teaching and learning process for deaf learners [7], [20], [16] and [15]. Thus, the researchers suggested that the computerized glossary can affect the students’ performance in vocabulary skills and improve their retention of the new words.

**The purpose of the study:**

This study aimed to investigate the effect of a computerized glossary on vocabulary skills of the third-grade deaf students and their retention.

**Questions of the study:**

This study aimed to answer the following questions:

- Are there any statistically significant differences at ($\alpha=0.05$) in student’s vocabulary skills that are attributed to the teaching strategy?
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- Are there statistically differences in deaf students’ retention of the new vocabulary items attributed to the teaching strategy?

**The significance of the study:**

To the best of the researchers' knowledge, the studies that investigated the use of computerized glossary on teaching vocabulary skills for deaf students in Jordan are very rare. Accordingly, this study may help the third-grade deaf learners improve their vocabulary skills and their English, and help the teachers of deaf learners benefit from a new effective method for teaching them.

For EFL students, the computerized glossary strategy can be an easy method to be used actively; the methods have videos that include sign language, pictures, examples from the Students' textbook; and the videos can be repeated at any time and place. Thus, this strategy or method may help EFL learners improve their vocabulary skills.

The computerized glossary will allow teachers to show the vocabulary to teach students how to interpret vocabulary items by sign language for EFL teachers, to help students develop a connection between vocabulary items and their images; students can see the vocabulary items in context and can understand their spelling and meaning. The computerized glossary may help the students to improve their performance in using vocabulary.

The findings of the present study are hoped to be beneficial for policy makers and curriculum designers to encourage them to use the computerized glossary as an innovative strategy in teaching deaf learners in different grades.

**Operational Definition of Terms**

**Computerized Glossary:**

Computerized Glossary is defined by [21] as "a collocation of textual glosses or of specialized terms with their meanings". In this study, the computerized glossary consists of the main items in the texts in units 5, 6, 7 and 8 in Action Pack 3 and their meanings in sign language.

**Students' Retention**

Students' Retention is related to the ability of the students to keep or hold something. [22] explained retention as "a continuum from word recognition to productive use". In this study, retention is based on students' understanding, memorability, responses, and reactions toward the glossary as a visual aid. They will be measured by the students' scores in the vocabulary post-test.

**Vocabulary skills:**

Vocabulary skills Cambridge dictionary defined the word vocabulary as "all the words known and used by a particular person". Therefore, vocabulary may be considered as the base of any language acquisition. In this study, it refers to the vocabulary included in Action Pack 3 (is the English language curriculum for the third grade in Jordanian schools during the year 2019-2020, which is adopted by the Jordanian Ministry of Education. It is based on the General Guidelines and Specific Outcomes for the English Language in Jordan [23].

**Review of Related Literature**

Very few studies were conducted to investigate the effectiveness of the computerized glossary and the students’ retention towards learning by using this strategy. In this respect, [24] conducted a study about teaching deaf students, they used printing and drawing presented by sign language through using digital videos of signs in exercise for words identification which are presented by the signed vocabulary. The results of their study revealed that multimedia helps deaf students connect between the vocabulary items and what they watched on videos and by using multimedia which affected their reading comprehension positively.

[25] examined the use of computer technology, hand cues and visual phonics in teaching reading for deaf students at first grades that strengthens their knowledge of vocabulary items. The researchers used the test to examine the effectiveness of the mentioned method for teaching deaf learners. The results showed that computer technology, hand cues and visual phonics had improved deaf learners' reading as well as pseudo word coding. Thus, the researchers recommended using computer technology for teaching deaf students and using hand cues and visual phonics to improve students' retention.

[26] conducted a study about retention and graduation of the students with disabilities, facilitating the students' success. The researchers divided the participants into three groups- regardless of the students' ability or disability. The duration of the study was for four years. They also defined retention in their study as "the students being enrolled in at least one course for credit" [25]: 118). The methodology selected to analyze the data is a qualitative one. The findings of the study revealed that students who have learning disabilities and retention issues need to take a semester or two longer than other students to graduate.

[27] conducted a study in Jordan about the challenges that deaf students and students with hearing difficulties are facing, and how to help them in their education. The researchers used qualitative research, two instruments were used; observations and interviews. The participants were deaf students from four schools that have deaf students in Jordan. The results showed that the deaf students need remedial program to help and facilitate their
education process. In addition, the researchers recommended using technology and other programs in teaching deaf learners to improve their retention towards learning the second language, and they confirmed that there is need to train the teachers to teach.

[28] investigated the effects of using computers on teaching students with post-lingual hearing impairment in a public basic school in Ghana. The sample of the study consisted of five students with post-lingual deafness; the instruments of the study were an interview and an observation. The results of the study revealed that there is a communication gap between the students and their methods used to facilitate or enhance the deaf learners' academic level at the inclusive school. Therefore, the study recommended using methods for disabled students and creating opportunities for them in the classroom to help them interact with their colleagues and to improve their skills.

[6] conducted a study about the effectiveness of using visual material in improving EFL deaf students' retention on teaching vocabulary items. The researcher divided the 80 deaf participants into two groups; experimental and control, as she used 50 target vocabulary items in the study and she taught 10 vocabulary items each week using sign language with visual materials for experimental group, and sign language for the control group. The results of the study showed that visual materials had improved EFL deaf students' retention on teaching vocabulary.

[29] focused on the assistive technology such as video modeling in the classroom for teaching deaf and hard hearing learners. The researchers observed the effectiveness of using technology on deaf and hard hearing learners from different grades. The results of the study presented that using technology increased the educational, emotional, behavioural, and social outcomes of deaf and hard hearing students. The researchers recommended using technology, software, videos, and computers in teaching deaf learners to improve their knowledge.

[30] studied the effectiveness of technology in developing the creative thinking skills for the deaf learners. The participants of the study were 8 deaf intermediate students in the first grade. A quasi-experimental design is used with pre-post test to examine the effectiveness of technology. The results of the study showed that technology had a statistically significant effect on improving the critical thinking skills for the learners.

Concluding Remarks

As for the effectiveness of the computerized glossary on deaf students' vocabulary skills, the review of related literature revealed that the computerized glossary, multimedia, and the different shapes of CALL have a positive effect on deaf students' learning in different grades and with different skills (e.g., [24], [25], [29] and [30]).

Student's retention is considered to be one of the key factors that affect deaf students' performance in the vocabulary skills and learning the second language. Thus, few studies were conducted to investigate deaf third-grade students' retention when using a computerized glossary strategy in learning the vocabulary skills (e.g. [25], [26], [27] and [6]).

[6] this study is congruent with the present study since they both investigated students’ retention towards using the computerized glossary in teaching the vocabulary skills. But, the two studies differ in the participants' grade, instruments that are used for collecting data, the period of the study, the place of implementing the study and the samples that were tested.

Unlike the previous studies, the present study explored the effect of the computerized glossary, on third grade students' vocabulary learning and their retention of what they learn. Therefore, this study is hoped to fill the gap in the related literature by presenting the use of the computerized glossary to improve the third-grade deaf students' performance in the vocabulary skills and to improve their retention of the new vocabulary.

2. Methods and Procedures

Design and Participants of the Study

This study followed the quasi-experimental design in the sense that the sample was divided into two groups; one experimental group and one control group with two variables; independent variable which is the teaching method (the computerized glossary strategy as opposed to the conventional teaching method), the dependent variables are the students’ performance in vocabulary skills and the students' retention of the new vocabulary.

The participants of the study consisted of 43 third-grade male and female EFL deaf students who study at Al Amal School in Jordan, at Irbid governorate, in the second semester of the academic year 2019/2020. They were purposefully chosen then randomly divided into an experimental group (22 students) and a control group (21 students).

Instruments of the Study and their Validity and Reliability

The researchers designed pre-post and delayed vocabulary test to examine the effect of the computerized glossary on the third-grade deaf students' performance in vocabulary, and the delayed-test is used to measure the students' retention of the new vocabulary. The vocabulary skills were recognizing the meaning of the words,
knowing the spelling of words, using picture clues to predict the meaning of simple words, inferring the meaning of words through the context, and writing the correct spelling of the words.

In order to establish the face and content validity of the vocabulary skills test, a panel of eleven experts was consulted—the same experts for the instructional program—and the researchers asked them to give their comments and advice about the test. The experts approved the content of the test and encouraged for applying it. Furthermore, the content validity was established by conducting the content analysis of textbook through table of specifications (Table 1).

The reliability of the vocabulary skills test was established by using Cronbach Alpha approach. Table 2 illustrates Cronbach Alpha approach for each vocabulary sub-skill and the vocabulary skills test. As shown in Table 2, Cronbach alpha coefficient is used for recognizing the meaning of the words, knowing the spelling of words, using picture clues to predict the meaning of simple words, infer the meaning of words through the context, and write the correct dictation of the words were .82, .85, .87, 81, and .84, respectively, and it was calculated to be .84 for the entire scale, and all above the cut-off value .70 (Cronbach, 1951).

### Table 1. Table of Specifications for the Vocabulary Test.

| No. | Vocabulary Sub-skills | Number of the question | Mark | % |
|-----|-----------------------|------------------------|------|---|
| 1   | Recognize the meaning of the words | Q1 (10 items) | 10 | 20 |
| 2   | know the spelling of words | Q2(10 items) | 10 | 20 |
| 3   | Use picture clues to predict the meaning of simple words. | Q3 (10 items) | 10 | 20 |
| 4   | Infer the meaning of words through the context. | Q4 (10 items) | 10 | 20 |
| 5   | Write the correct dictation of the words. | Q5 (10 items) | 10 | 20 |
| Total | | 5 | 50 | 100 |

### Table 2. Summary Results of Vocabulary Skills Test Reliability

| Sub-skill | Correlation Coefficient | Test-retest Coefficients |
|-----------|-------------------------|--------------------------|
| Recognize the meaning of the words | .82 | .85 |
| Know the spelling of words | .85 | .81 |
| Use picture clues to predict the meaning of simple words | .87 | .88 |
| Infer the meaning of words through context | .81 | .86 |
| Write the correct dictation of the words | .84 | .85 |
| Vocabulary Test | .84 | .85 |

### The treatment: Teaching the experimental and control groups

The same teacher instructed both experimental and control groups according to Teacher's Book 3. Using the sign language and students' textbook, the control group was taught using the conventional method, while the experimental group was taught using the students' textbook, the computerized glossary technique and implementing the designed instructional program. In each lesson, the teacher presented the videos that show the vocabulary items with their Arabic meaning, sign language, picture, spelling and an example from the students' textbook to see the vocabulary items in the context. Furthermore, the teacher provided the students with the videos to watch at their homes and to imitate the teacher in the videos and to improve their vocabulary skills and retention.

The computerized glossary consisted of vocabulary items that are included in chapters 5, 6, 7 and 8, as in each video there is a teacher who reads the English written vocabulary items with the sign language, the Arabic meaning of the vocabulary items, with the picture that presents each vocabulary item and with example from the students' textbook that consisted of vocabulary item.

### 3. Results of the Study and Discussion

**Table 3. Results of Means and Standard Deviation of Vocabulary Subskills for the Pre-test and Post-test**

| Vocabulary Sub-skills | Group | Pre-test Mean | Pre-test Std. Deviation | Post-test Mean | Post-test Std. Deviation |
|-----------------------|-------|--------------|-------------------------|---------------|-------------------------|
| Recognize the meaning of the words | Experimental | 5.273 | 1.162 | 9.818 | .501 |
| | Control | 4.762 | 1.179 | 8.191 | 1.078 |
| Know the spelling of words | Experimental | 4.636 | 1.136 | 8.818 | 1.006 |
| | Control | 5.524 | 1.078 | 7.427 | .926 |
| Use picture clues to predict the meaning of simple words | Experimental | 5.909 | 1.445 | 9.182 | 1.181 |
| | Control | 5.238 | .995 | 8.191 | 1.078 |
| Infer the meaning of words through the context | Experimental | 4.364 | 1.329 | 8.636 | .953 |
| | Control | 4.857 | 1.493 | 6.571 | 1.287 |
| Write the correct dictation of the words | Experimental | 6.091 | 1.445 | 9.727 | .883 |
| | Control | 6.000 | 1.265 | 8.286 | 1.586 |

*The maximum score for each vocabulary sub-skill is 10.

In order to answer the first question of the study: Are there any statistically significant differences at (α=0.05) in student’s vocabulary skills that are attributed to the teaching strategy? As computerized glossary vs. conventional, the researchers calculated the means and standard deviations of students' performance in the experimental and control groups for the students’
vocabulary subskills. (i.e., recognizing the meaning of the words) were extracted for the vocabulary pre-post test. Table 3 presents the results of the study.

It is clear from Table 3 that there are observed differences between the mean scores of the experimental group performance and the mean scores of the control group performance in favor of the experimental group in the five vocabulary sub-skills as measured using the vocabulary test. In other words, the mean scores of the experimental group performance are higher than the mean scores of the control group in the five vocabulary sub-skills as measured by the vocabulary test.

While, to answer the second question of this study which is: Are there any statistically significant differences in deaf students' retention of the new vocabulary attributed to the teaching strategy? The researchers calculated means and standard deviations of the experimental group performance in the posttest and the retention test were extracted. Furthermore, to test the statistical significant difference in mean score of the experimental group performance in posttest and the retention test for each vocabulary sub-skill and the combined vocabulary subskills, repeated measures analysis (i.e., paired samples t-test) were extracted. Table 4 illustrates the summary results of paired samples t-test.

As shown in table 4, the results revealed a non-significant difference for the experimental group performance in posttest and retention test for recognizing the meaning of words sub-skill, (t (21) = .00, p> .05). Accordingly, the computerized glossary approach contributed to students' retention to recognize the meaning of the words. For knowing the spelling of words sub-skill, the results revealed non-significant difference in the experimental group performance in the posttest and retention test, (t (21) = -2.027, p> .05). Accordingly, the computerized glossary approach contributed to students' retention to know the spelling of words.

For using picture clues to predict the meaning of simple words sub-skill, the results revealed non-significant difference in the experimental group performance in the post-test and retention test, (t (21) =1.000, p> .05). Accordingly, the computerized glossary approach contributed to students' retention to use picture clues to predict the meaning of simple words.

For inferring the meaning of words through context sub-skill, the results revealed non-significant difference in the experimental group performance in the post-test and retention test, (t (21) =-1.578, p> .05). Accordingly, computerized glossary approach contributed to students' retention to their ability to infer the meaning of words through the context.

For writing the correct dictation of the words sub-skill, the results revealed non-significant difference in the experimental group performance in the post-test and retention test, (t (21) =-1.283, p> .05). Accordingly, computerized glossary approach contributed to students' retention to write the correct dictation of the words.

Finally, for the combined vocabulary sub-skills, the results revealed non-significant difference in the experimental group performance in the posttest and retention test, (t (21) = -1.548, p> .05). Accordingly, computerized glossary approach contributed to students' retention to write the correct dictation of the words.

| Vocabulary Sub-skills | Test  | Mean | Standard Deviation | t-value | df  | Sig |
|----------------------|-------|------|--------------------|---------|-----|-----|
| Recognize the meaning of the words | Post  | 9.818 | .501               | .000    | 21  | 1.000 |
|                       | Retention | 9.816 | .588               | -2.027  | 21  | .056 |
| Know the spelling of words | Post  | 8.818 | .588               | -1.283  | 21  | .213 |
|                       | Retention | 9.091 | .971               | -1.548  | 21  | .137 |
| Use picture clues to predict the meaning of simple words | Post  | 9.182 | 1.181              | 1.000   | 21  | .329 |
|                       | Retention | 9.000 | 1.024              | -1.578  | 21  | .129 |
| Infer the meaning of words through the context | Post  | 8.636 | .953               | -1.283  | 21  | .213 |
|                       | Retention | 8.955 | .899               | -1.548  | 21  | .137 |
| Write the correct dictation of the words | Post  | 9.727 | .883               | -1.283  | 21  | .213 |
|                       | Retention | 9.909 | .425               | -1.548  | 21  | .137 |
| Total                 | Retention | 46.182 | 2.612              | -1.548  | 21  | .137 |
Discussion of the Results

The present study examined the effect of a computerized glossary instructional program on deaf students' learning English language vocabulary and their retention in Jordan. The results of the pre-post test proved that there is significant effect of the computerized glossary on deaf students' vocabulary skills. These results were congruent with the findings of [28] who investigated the effects of using a computerized program on teaching deaf students and revealed positive effect on the program. Moreover, there are different studies which revealed that the computerized glossary had an effect on deaf students such as (e.g., [24],[25],[16] and [29]).

For the second question of this study, the results of the delayed-test showed that deaf students' retention became better after learning by using the computerized glossary. [6] investigated the effect of a computerized glossary on the students’ retention in new vocabulary and found that students' retention improved when using the computerized glossary. There are different studies which revealed that the computerized glossary had a significant effect on the deaf students such as (e.g., [25], [26] and [27]).

The results of this study revealed that the implementation of the instructional program based on computerized glossary affected the students' performance positively. Thus, the students become skillful (adept) at the five mentioned vocabulary skills. So, the EFL deaf students can understand, interact, imitate, read and write the new vocabulary items that they have learned. This improvement in the vocabulary learning can be reflected directly and effectively on the deaf students' learning of English language. As well, they can overcome the main obstacles that they are accustomed to face during learning new English words through the use of the conventional method of teaching. The computerized glossary used in this study provided proper conditions for receiving the computerized output for each word, thereby directing the deaf students to scaffold the vocabulary items comprehensively.

Furthermore, the results showed that the students' retention become better as they can remember the meaning of the vocabulary items, the spelling of the vocabulary, remember the suitable picture that is related to each vocabulary item and know the meaning of the words from the context. Accordingly, the computerized glossary helps deaf students develop their vocabulary and memory to become smarter and they can quickly recall the vocabulary items and answer the vocabulary test easily. Moreover, the computerized glossary made the process of teaching English vocabulary items for the third-grade deaf student easier, more active, and effortless to be imitated and can be used at any time or place. To sum up, the third-grade deaf students at Al Amal School had positive retention and they were affected by using the computerized glossary in learning the five vocabulary subskills.

These results revealed positive effect of the computerized glossary and the students' positive retention of the new words. These results are inconsistent with most of the previous studies that were conducted to investigate the effectiveness of computerized glossary on the deaf students' vocabulary skills such as: [28], [24], [25], [16] and [29] and with the studies about the students' retention such as [6], [25], [26] and [27]. But this study is the only one conducted in Jordan about using technology to teach English vocabulary items to third-grade deaf students.

4. Conclusions

The present study concluded that the computerized glossary instructional program effectively enhanced the vocabulary skills and the students' retention. In addition, it reported similar conclusions to those that were conducted by most researches on the effect of computerized glossary on vocabulary subskills. That means, the present study has contributed empirically to this research area, and there was a relationship between computerized glossary instructional program, vocabulary skills and improving the students' retention. Accordingly, there was clear evidence that the computerized glossary instructional program had an effect on the students' retention and on learning the skills of the vocabulary items, and it improved their English language in general.

5. Recommendation

According to the findings of this study, there are recommendations based on using the computerized glossary to improve the vocabulary skills of EFL deaf students:

- The researchers recommended using the computerized glossary on teaching the first grades' deaf students.
- EFL supervisors are recommended to ask the teacher and to raise their awareness of using the computerized glossary in teaching vocabulary skills.
- The teacher has to be trained on how to use the computerized glossary in the instruction of deaf students. Particularly in teaching vocabulary skills and English language subskills.
- The practices of teaching deaf students should be developed to have better results and to improve deaf students' performance.
- The computerized glossary can be applied on other skills such as reading, listening and writing.

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