

# The Effects of Drama Activity Utilizing Story-Telling on Vocal Vibration and Voice Energy of Pre-Kindergarten Teachers

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## Abstract

**Background/Objectives:** The purpose of this study was to investigate the effects of drama activity utilizing story-telling on the vocal vibration and the voice energy of pre-kindergarten teachers.

**Methods/Statistical analysis:** For the study, five pre-kindergarten teachers enrolled in the 4-year early childhood education department of the university in Yeongdong-gun in Korea were collected through the same space and recording device. We collected and analyzed their voice by using the praat voice analysis program that uses the pitch to measure the vocal vibration and the intensity to measure the voice energy.

**Findings:** After this drama activity utilizing story-telling, the pitch and strength measurements of the pre-kindergarten were significantly higher than those before that activity.

**Improvements/Applications:** It is suggested that this drama activity utilizing story-telling induces the interest and fun of the pre-kindergarten.

**Keywords:** Voice analysis, Pre-kindergarten teacher, Drama activity utilizing story-telling, Vocal vibration, Voice energy.

## 1. Introduction

Fairy tales are an appropriate teaching medium to help children with imagination and creativity to enrich their pre-reading literacy skills. In particular, fairy tales are regularly provided almost every day in the early childhood education institute, are experienced diverse role of children in the reading process shared with adults [1]. There are a number of studies that have helped young children develop learning, personality and sociality and have a positive effect on emotional and psychological stability according to adult language types [2].

Despite the fact that a lot of fairy tales are delivered to infants through various images, pictures and photographs [3], the storytelling activity, through which the story is conveyed through the interaction between the listener and the speaker, has a great influence on the language ability of young children [4]. The meaning of a fairy tale fairy tale is to express the fairy tale in natural story form according to the fairy tale of the fairy tale [5]. That is, the fairy tales are a form of literature that allows the young children to visually imagine the contents of the fairy tale and tells the story in a narrative form so that the story can be understood well.

Over the past several years, as cloud computing and machine learning technologies have evolved, speech recognition technology has improved significantly. In the 2016 AI trends (technology trends seminar), experts say, "The field of speech recognition will expand beyond the user experience based on one-on-one (visual) and contact." In recent years, KEPCO has introduced voice and speech recognition services for telephone counseling, and there is an increasing number of areas where

voice awareness emergency bells are being installed as violent crimes against women are increasing.

Speech Recognition is a process in which a computer interprets a spoken language that a person speaks and converts the content into character data. A typical algorithm is HMM (Hidden Markov Model), which constructs an acoustic model by statistically modeling voices uttered by various speakers and constructs a language model by collecting corpus. Speech recognition is influenced by pronunciation, vocabulary, and intonation depending on the social language environment and the personal habits of speech. In other words, each person has a different voice organization, language habits, and emotions. In addition, speech recognition can vary depending on whether the person is in the same situation or the emotions are changed.

Diversity activities such as sensory opening [6], casting selection [7], playing [8], sense expression and role play, and story making [9] are developed. The characteristic of the drama activity using the fairy tales is that they play roles after selecting the casts for each voice and character. Therefore, in the process of performing the activity of the drama using the fairy tales, the change of the vocal cords in a short period of time is great, and one person can change most of the voices and the voice change can be caused the most.

In studies reporting objective voice indices of emotional speech, it has been demonstrated that the emotional state of the speaker is related to the fundamental frequency of speech, voice strength, and speech speed [10, 11]. In most of these studies, the acoustic characteristics of voice were analyzed when emotions were written on actors, voice actors, and vocalists who use voices, meaningless words, meaning words, and sentence sentences. The study measured the changes in the speech signal analysis elements

related to the interest in order to determine the effect of stress on the liver [12]. As a result, the 3 formant frequency bandwidths value increased when all the subjects showed cruel and repulsive video, and the 3 formant frequency bandwidths value, which is similar to the usual one, showed when calm and calm video was shown. A study studied some influence on voicing through rising in blood pressure by applying pitch that measure vocal fold vibration and intensity that measure voice energy size that is one of technique [13].

As a result of analyzing the characteristics of the fundamental frequency and the speech intensity of the voice in the fairy tales about the story tellers, they showed a higher difference in the speech intensity than the ordinary people [14]. The results of the comparison of the voice characteristics in the reading and assimilation of the story tellers showed that the voice in the assimilation was higher than that in the reading. In addition, the phonetic characteristics of the story tellers showed the highest frequency in the order of joy, anger, anxiety, and sadness, followed by anger, joy, anxiety, and sadness [14].

It is necessary to adapt a fairy tale to a drama activity utilizing story-telling for pre-kindergarten teachers. Until recently, there have been no studies on the characteristics of the fundamental frequency and the speech intensity of the pre-kindergarten teachers. Therefore, it would be meaningful to examine through the voice analysis how the drama activity utilizing story-telling are affecting the emotions of the pre-kindergarten teachers. These pre-kindergarten teachers, who feel emotions through emotional exchanges by becoming direct heroes in the drama activity utilizing story-telling, have positive emotions in many ways.

The purpose of this study was to investigate the effects of the drama activity utilizing story-telling on their vocal vibration and voice energy through the speech recognition analysis to analyze effects of the drama activity utilizing story-telling on felling and emotions of pre-kindergarten teachers.

In order to accomplish the purpose of this study, the following research problems were set up.

Research Questions 1. What is the effect of the drama activity utilizing story-telling on the vocal vibration of the pre-kindergarten teachers?

Research Questions 2. What is the effect of the drama activity utilizing story-telling on the voice energy of the pre-kindergarten teachers?

## 2. Materials and Methods

We collected and analyzed their voice by using the praat voice analysis program that uses the pitch to measure the vocal vibration and the intensity to measure the voice energy.

### 2.1. Participants

The subjects of this study were 5 pre-kindergarten teachers in the 3rd grade of early childhood education at U University in Chungcheongbuk-do. All of the subjects were 22 years-old and female students. There were no laryngeal, pulmonary, neurological, oral, or articular organ diseases that caused voice problems in all subjects.

### 2.2. Measurement of Vocal Vibration

Pitch is a voice analysis element that represents the pitch of a note and is also called pitch. Vibration of the vocal cords, that is, vibrating vocal cords. Physically speaking, this means the difference in the frequency of the sound. As for the auditory stimulus, it is felt high when the frequency is high and low when the frequency is low. The absolute pitch represents the frequency

of one second of the background sound in hertz. The range of frequencies that can be felt by human ears varies from 16 hertz to 20,000 hertz, depending on the person and age.

### 2.3. Measurement of Vocal Energy

Intensity means the intensity of speech energy. At one point, the negative energy flowing in a unit time through a unit area perpendicular to the traveling direction of the sound wave is called the negative intensity at that point.

### 2.4. Research Procedure

This drama activity utilizing story-telling were performed step by step in a certain order. The steps of the activity of the same activity proceeded with the reference to [15], to select the works, to select the works, to hear and recall the stories, to determine the role and role of the actor, to practice the actor, to prepare the actor, respectively. The procedure of concrete activity is shown in Figure 1.

Speech signal collection was analyzed by pre-kindergarten teachers' voice before and after the drama activity utilizing story-telling. Speech analysis was performed using the praat voice analysis program and voice was collected through the same space and recording device. For the purpose of voice analysis, the sentence "I am happy" was selected, and the voice before the drama activity utilizing story-telling was collected first and the voice was collected after the first drama activity utilizing story-telling for one hour.

The contents of this drama activity utilizing story-telling are shown in Table 1.

## 3. Results and Discussion

In this paper, we analyzed the influence of pre-kindergarten teachers' pupil activity. For this purpose, the voice signal analysis experiment was performed and the significance was derived in the pitch and intensity fields among various voice signal analysis parameters. The experiment was conducted by collecting and analyzing the voice before and after performing the activity.

Pitch is a voice signal analysis element representing the pitch of the sound. In other words, the pitch is the vibration of the vocal cords. It is to analyze the vibrations of the vocal cords. That is, it means vocal fold vibration. Physically speaking, this means the difference in the frequency of the sound. As for the auditory stimulus, it is felt high when the frequency is high and low when the frequency is low. The absolute pitch represents the frequency of one second of the background sound in hertz. The range of frequencies that can be felt by human ears varies from person to person, but generally ranges from 16 to 20,000Hz.

Intensity means the intensity of voice energy. At one point, the negative energy flowing in a unit time through a unit area perpendicular to the traveling direction of the sound wave is called the negative intensity at that point.

Experiments on voice signal analysis are shown in Figure 3. Figure 3 shows the waveforms and pulse signals at the top. In addition, the lower part shows waveforms in which vocal fold vibration; voice energy magnitude, formant frequency, and the like are analyzed. There are almost no waveform changes caused by voice waveforms, pulse waveforms, and voice analysis elements before and after performing the polarity activity. However, as a result of the numerical analysis, significant results were obtained in the pitch measuring the vocal fold vibration and the intensity measuring the voice energy magnitude.



Figure 1: The process of this drama activity utilizing story-telling

Table 1: Hansel and Gretel 'Ouch, Ouch, my stomach hurts!'

Hansel: I ate milk and cakes I gave by a witch, but the color was strange and the smell was nasty. My stomach hurts.  
 Ellie: How did the stomach hurt?  
 Hansel: The stomach hurts like a stomach piercing the stomach with a needle.  
 Ellie Fairy: What? Then Hansel seems to have food poisoning now. Gretel, would you like to take a break with your brother?  
 Gretel: Yes, I see.  
 Wicked Witch: What are you doing resting?  
 Cuckoo Witch: That's right

Omitted below

This drama activity utilizing story-telling and voice recordings are shown in Figure 2.

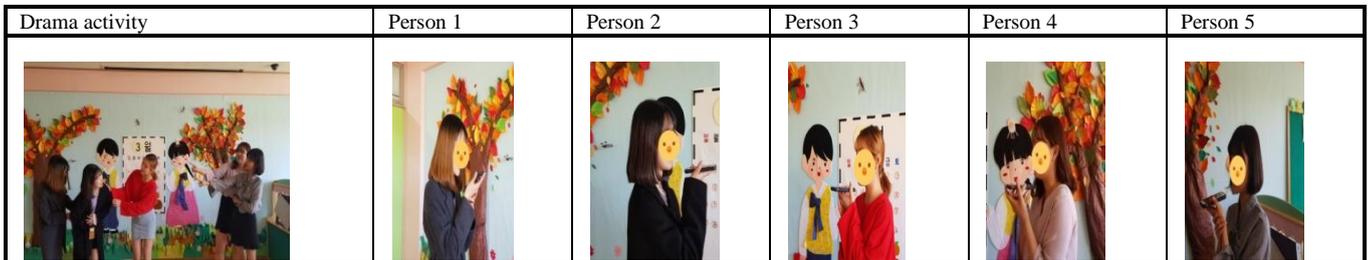


Figure 2: This drama activity utilizing story-telling and voice recordings

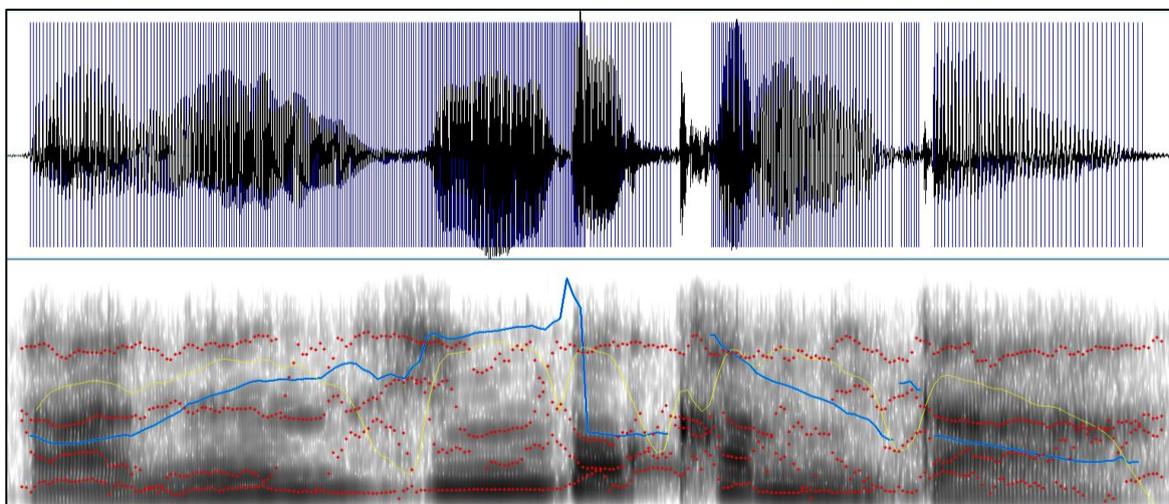


Figure 3: Voice analysis process

Table 2 shows the results of the pitch analysis. Vocal vibration increased after all subjects participated in the experiment. The increased vibrations of the vocal cords seemed to be of interest and fun because of the activity of the parietal.

**Table 2.:** Pitch analysis result

	Before practice	After a practice	Change
Person 1	261.167	287.007	+25.840
Person 2	252.152	260.536	+8.384
Person 3	276.159	286.245	+10.086
Person 4	233.733	280.215	+46.482
Person 5	257.616	268.008	+10.392

Table 3 shows the results of strength analysis. After all subjects participated in the experiment, the size of voice energy increased. The results of this experiment are similar to those of the vocal tract vibration analysis.

**Table 3.:** Intensity analysis result

	Before practice	After a practice	Change
Person 1	77.6335	81.9728	+4.3393
Person 2	77.9104	78.6579	+0.7475
Person 3	76.2142	81.0667	+4.8525
Person 4	74.4988	80.1633	+5.6645
Person 5	78.9619	81.0930	+2.1311

As a result of the experiment, the pitch and strength measurement values were increased by performing the polarity activity. These results suggest that the activity of the parietal larynx induces interest and fun, resulting in an increase in the vocal fold vibration and an increase in the voice energy.

## 4. Conclusion

First, after the drama activity utilizing story-telling, the vocal vibration(pitch) measurements of the pre-kindergarten teachers were significantly higher than those before this activity. This means that the drama activity utilizing story-telling makes vocal vibration of the pre-kindergarten faster. Second, after the juvenile drama activity, the strength(intensity) measurements of the pre-kindergarten were significantly higher than those before that activity. This means that the drama activity utilizing story-telling makes vocal energy of pre-kindergarten larger. Therefore, it is suggested that the drama activity utilizing story-telling induces the interest and fun of the pre-kindergarten teacher.

Many researchers agree that the acoustic characteristics of speech are very important in expressing effective communication and speaking emotions. The related studies use various analyzers to objectively analyze various aspects of emotional speech. Nevertheless, there are few studies on speech analysis using speech analyzer. Therefore, this study which has a scientific analysis of the emotional aspects of pre-kindergarten teachers has significant significance. Therefore, further study should be done to measure and compare the effects of the same activities over one or more sessions over three months.

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