Examining the Impact of Video Modeling Techniques on the Efficacy of Clinical Voice Assessment

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Summary: Objectives. The purpose of the current study was to determine whether or not presenting patients with a video model improves efficacy of the assessment as defined by efficiency and decreased variability in trials during the acoustic component of voice evaluations.

Methods. Twenty pediatric participants with a mean age of 7.6 years (SD = 1.50; range = 6–11 years), 32 college-age participants with a mean age of 21.32 years (SD = 1.61; range = 18–30 years), and 17 adult participants with a mean age of 54.29 years (SD = 2.78; range = 50–70 years) were included in the study and divided into experimental and control groups. The experimental group viewed a training video prior to receiving verbal instructions and performing acoustic assessment tasks, whereas the control group received verbal instruction only prior to completing the acoustic assessment. Primary measures included the number of clinician cues required and instructional time. Standard deviations of acoustic measurements (eg, minimum and maximum frequency) were also examined to determine effects on stability.

Results. Individuals in the experimental group required significantly less cues, $P = 0.012$, compared to the control group. Although some trends were observed in instructional time and stability of measurements, no significant differences were observed.

Conclusions. The findings of this study may be useful for speech-language pathologists in regard to improving assessment of patients' voice disorders with the use of video modeling.

Key Words: voice disorders–clinical assessment–video models–acoustic analysis–training.

INTRODUCTION

The process of completing an acoustic voice assessment for a patient with a voice disorder typically comprises relatively novel tasks. Explicit instruction and models or task examples are required for participation in the assessment and the production of accurate results. Some of the tasks may be somewhat familiar, but for most patients, an acoustic voice assessment involves new learning to complete the task within the appropriate parameters.

As many healthcare services that speech-language pathologists provide often necessitate the integration of patient education, there are increased opportunities for the use of digital technologies to assist in this learning. One area in which technology use has increased is with video modeling. Video technology for modeling purposes has been used extensively in speech-language pathology as an intervention for children and adults with Autism Spectrum Disorders (ASD) and other developmental disorders.[1–4] In studies examining video modeling and live modeling for teaching children with ASD a variety of social and cognitive-linguistic tasks, findings have suggested that video modeling resulted in more efficient skill acquisition. When teaching a type of skill, video models combined with voiceover instruction increases independent response during acquisition of a taught skill.[3] Generalization of skills taught through video modeling across life settings has also been noted.[1–3]

The efficiency and effectiveness of video modeling is discussed extensively in the literature as it relates to the ASD population.[4–6] For example, video modeling can be viewed multiple times until the target individual understands the task being presented. Live modeling, on the other hand, is less accurate in additional presentations and requires time from the individual presenting the model.[4] A single video can be used with multiple individuals, and many individuals view a video model to be more motivating, given that the video is considered a novel addition to the learning environment.[5,6] For carryover and generalization to succeed initial acquisition, Bellini and Akullian[7] suggested that video models be comparable to the individual viewing it, meaning that children are more likely to attend to a video model of another child their age.

Video modeling techniques have also been used in the realm of voice therapy. In one study, van Leer and Connor[8] provided adults enrolled in a voice therapy program with models of home practice exercises on a portable digital media player. Patients were found to be more compliant in completing voice exercise regimens when provided with a video model in addition to written instructions compared to those only given written instructions. Individuals who received a video model for practice had significantly greater practice frequency and higher motivation to complete home exercises.

The question to be considered is, what aspects of video modeling lead to such apparent effectiveness for initial acquisition and generalization of such tasks? For effective and efficient teaching of a concept or task, the mode of presentation must be considered. This element is secondary to the working memory process and the fact that capacity is limited as it relates to auditory and visual processing.[9] The cognitive load theory considers working memory limitations and modifications that can be made to reduce the cognitive load of instruction. Cognitive load is impacted by both causal factors (individual characteristics, task

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complexity, and environmental factors) and assessment factors (mental load, mental effort, and performance).[10]

The extent of cognitive load is determined by instructional design.[11] The *multiple representation* principle states that it is beneficial to present information in words and pictures rather than words alone.[9] The *modality* principle postulates that words are best presented as an auditory narration compared to on-screen, visual text.[12] Research conducted by Constantinidou and Neils[13] and Constantinidou et al[14] found that when presenting words and pictures to young, healthy subjects and young subjects with moderate to severe brain injuries, recall and recognition was greater during visual-only tasks and auditory visual combinations when compared to strictly auditory presentation. Constantinidou and Baker[15] found the implementation of visual support to be just as beneficial in older adults. Combining auditory and visual content with close proximity into multimedia instruction reduces extraneous load when it comes to memory and increases overall learning efficiency.[10–12]

Within the field of speech-language pathology, video modeling has been explored across a variety of patient types and populations. Research supports that implementation of a video model may be impactful for task teaching and specific skill learning. Video modeling as it relates to teaching skills for adequate voice assessment completion has yet to be explored. Within a voice assessment, obtaining accurate results and measures is important for diagnostics and treatment planning, and often these measures are utilized as research variables for assessing treatment outcomes.

The purpose of the current study was to determine whether or not presenting a patient with a video model leads to an increase in the overall efficacy of the voice assessment. Healthy children, college-age individuals, and older adults with no known voice pathologies were either shown a video model that combined both verbal and visual instruction or provided with verbal instructions only prior to completing a simulated voice assessment. In this study, it was hypothesized that individuals who were shown the video prior to assessment would require less cues and complete the assessment in less time. It was also hypothesized that with more instruction, greater reliability or repeatability over multiple trials would be observed. A secondary goal of the study was to explore whether or not variations in response to video modeling were evident when comparing age populations.

METHODS

Participants

Sixty-nine participants including 20 pediatric participants (10 males and 10 females) with a mean age of 7.6 years (SD = 1.50; range = 6–11 years), 32 college-age participants (16 males and 16 females) with a mean age of 21.32 years (SD = 1.61; range = 18–30 years), and 17 adult participants (8 males and 9 females) with a mean age of 54.29 years (SD = 2.78; range = 50–70 years) were enrolled in the study. Participants were recruited via flyers placed in university buildings and in the community; however, most participants were recruited by word-of-mouth. All participants were recruited from the Greater Cincinnati, Ohio area. Participants were paid $10 for their participation in the study.

Criteria for participation

Recruited participants for the study were excluded if self-report measures indicated a history of the following: smoking, current respiratory disease (eg, asthma, cystic fibrosis), or current neuromuscular disease (eg, multiple sclerosis). Participants were also excluded from the study if they (1) had previously been diagnosed with a voice disorder or were experiencing a voice disorder, (2) had been assessed for a voice disorder within the last 5 years, (3) had received a diagnosis of a learning disability, (4) had a hearing loss, (5) were suffering from an upper respiratory infection, or (6) were displaying a dysphonic voice perceptually evaluated by the researcher. Parents or guardians were able to serve as the primary informant of case history for all children. All participants/parents completed a case history form to ensure criteria for the study was met.

Procedure

All participants began preliminary documentation and screening tasks with a research assistant. To ensure single blinding procedures to the group assignment of participants, the main researcher was not present as the informed consent, questionnaire, hearing screening, voice screening, and video training corresponding to the assigned group was completed. This study was approved by the Miami University Institutional Review Board (00645r), and informed consent was obtained from all adult participants. Verbal assent and parent permission was obtained from all children participating in the study.

Hearing screening

All participants included in the study passed a bilateral pure tone hearing screening using a portable pure-tone audiometer (Maico Diagnostics, MA25, Eden Prairie, Minnesota, USA). Pure tones were presented at 25 dB HL and each participant was screened at 1000 Hz, 2000 Hz, and 4000 Hz.

Voice screening

Each participant passed a voice screening, which included a reading of the first three sentences of the "Rainbow Passage" into a microphone. The reading was recorded and perceptual qualities of the participant's voice were evaluated by a certified speech-language pathologist (SB).

Group assignment

Upon enrollment in the study, a simple stratified randomization procedure was executed allowing for equal dispersion of male and female participants within each age group.

Experimental group. After completion and passing of the voice screening, participants in the experimental group watched a prerecorded training video on a tablet. Two different videos were used; one for the college-age and older adult population with a college-aged model participant and one for the pediatric population with an 11-year-old model participant. The training video instructed the participants on how to complete acoustic voice assessment tasks used for obtaining maximum phonation time, phonation range measurements, and fundamental frequency. The video combined verbal instructions provided by

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