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Original Article

The Effects of Audio-Only and Audio-Video Materials on Listening Comprehension and Critical Thinking among Dental Students: A Focus Group Analysis

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ABSTRACT

Background: Listening is a fundamental skill in learning a second language and improving speaking proficiency. Despite the growing tendency among EFL teachers to test listening comprehension using computer-based audiovisual materials, the reported effects have been contradictory. This study aimed to compare students' comprehension levels in audio-only and audio-video listening tests and their correlation with critical thinking abilities.

Methods: This was a quasi-experimental study. Participants included 53 second and third year students at the Dental School of Babol University of Medical Sciences in 2018-2019 academic year. They were selected using convenience sampling, and answered 20 multiple-choice test items after listening to three different passages. The test was repeated in audio-video format after a two-week interval. In addition, the participants were administered a California Critical Thinking Skills test following the listening test.

Results: The t-test results indicated that the students' level of comprehension was significantly higher in the audio-video listening test compared to the audio-only test ($t=-9.030$, $df=52$, $P<0.05$). A notable relationship was also observed between students' performance in listening tests and their level of critical thinking. Given the results of the two tests, this relationship was found to be stronger in the audio-video test ($P=0.353$) than in the audio-only listening test ($P=0.313$).

Conclusion: Audio-video materials in listening tests appear to be more conducive to student comprehension, especially among those with higher critical thinking abilities. The findings in this study necessitate further assessment of the factors contributing to the learning process.

Keywords: Audio, Audio-video, Listening comprehension, Critical thinking, Dentistry

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Introduction

Listening is a fundamental skill in second language acquisition and in improving speaking proficiency (1-5). Unfortunately, it receives little attention in schools and particularly universities (6), and remains highly under-researched despite its importance (7-10). Several tools are employed in teaching and testing English as a foreign language, of which videos are the most favored ones, especially for the improvement of listening comprehension, and they are more widely utilized given the expansion of the Internet (7, 11, 12). In line with this, Feak and Salehzadeh (13) believed that video remained largely unexplored in different kinds of listening assessment. Relevant studies on the application of videos in listening instruction among medical and dental students are even sparser.

The employment of videos in teaching listening can be evaluated from different theoretical perspectives; dual coding theory postulates that human mind has distinct channels for visual and verbal information and processes them differently. Visual and verbal codes are processed, stored, and retrieved when needed in future. In this theory, receiving both verbal and visual input reinforces learners' understanding (14, 15).

In contrast, cognitive load theory reveals its effect when identical information is conveyed in different forms, and learners have to adjust their minds to these forms. Having to process multiple forms of the same information imposes an extra cognitive load on learners which hinders learning (16, 17).

The literature reports contradictory results about the employment of videos in listening tests. In a review of studies about the impact of multimedia on recorded first language lessons, Mayer (18) concluded that adding visual information improved comprehension, specifically when it contained explanations for students with less prior knowledge. Ginther (19) analyzed the impact of visuals stimuli on L2 listening comprehension in a study of TOEFL exams. There was no significant difference between the presence and absence of visuals, but they were more related to text type, although the difference was insignificant. Baltova (20) and Sueyoshi & Hardison (21) reported that participants preferred video-mediated tests. In contrast, the participants in Coniam's (22) and Suvorov's (23) studies expressed a preference for audio-mediated text. The subjects in Coniam's study complained that videos were distracting. Participants in Brett's (24) study favored multimedia presentations over audio or video passages. It was difficult to interpret the preferences of participants in Hernandez (25), as she used ambiguous item wording in her instrument. Other studies demonstrated better cognition and learning when using video-text content compared to audio-texts (3, 24). In a study comparing the effects of video and audio texts on listening comprehension skills in foreign language learners, some contradictory results were obtained, suggesting that audio documents can occasionally help students to concentrate on audio-elements (24). It was observed that video documents improve listening comprehension since videos display or justify what is said and enable learners to guess and anticipate what comes next (24).

Despite contradictory results, most studies have only compared the effectiveness of audio and video-mediated teaching of listening skills. Most have focused on a specific type of text such as monologue, conversation, or lecture, which could affect their results (7, 23, 24, 26). The other limitation in these studies could be the use of only a single type of test item (multiple-choice, true and false, fill-in-the-blank, or asking for a short summary) (7, 22, 25, 26). Also, there are several factors that affect listening comprehension, among which critical thinking has been highlighted in recent studies (27). Critical thinking has been given different definitions in the literature. According to Scriven & Paul (28), "critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation,

experience, reflection, reasoning, or communication, as a guide to belief and action" (28, 29). In most formal definitions critical thinking has been characterized "as the intentional application of rational, higher-order thinking skills, such as analysis, synthesis, problem recognition and problem solving, inference, and evaluation" (29-32). Unfortunately, there has been limited research investigating the relationship between students' level of critical thinking and their listening comprehension using audio-video materials.

The present study seeks to address these gaps in the literature and compare the comprehension abilities of students when they are exposed to audio-only and audio-video materials. To eliminate the effect of using a single text type or test format on students listening comprehension, the researchers used different text types including monologue, conversation, and lecture, and different test items such as multiple-choice, true and false and fill-in-the-blank questions. They also tried to inspect the relationship between critical thinking in participants and their level of listening comprehension when presented with audio-only and audio-video materials. The objective was to evaluate the extent to which the students with higher critical thinking benefit from each of the two approaches.

Methods

This was a quasi-experimental study with pretest-posttest design. The quantitative data were collected to compare participants' listening comprehension abilities in two modes of listening test (audio-only and audio-video). Audio-only tests and audio-video tests were administered after a two-week interval to assess the performance of the same group of participants, selected with convenience sampling. After the audio and video tests, the participants were administered a California Critical Thinking Skills test to find out if there was any relationship between their listening comprehension in previous two tests and their critical thinking skills. The data were analyzed using t-test for comparing students' comprehension in audio-only and audio-video listening tests and correlational coefficient was estimated in order to investigate the relationship between students' critical thinking score and listening comprehension in two test types. All the analyses were conducted using SPSS version 25.

The participants included 53 students majoring in dentistry at Babol University of Medical Sciences, Babol, Iran. They were second and third-year students selected through convenience sampling in 2018-2019 academic year. Sampling was done based on the available English courses at the time in Babol dental school. They had already passed General English for Dentistry course and were studying two levels of Special English for Dentistry (Levels 1 and 2). Accordingly, two different levels of English proficiency were assessed in this study. In total, 53 out of 69 students in both courses consented to take part in the study as they were interested to know about the results, specially their critical thinking scores. The other 16 students declined to participate as they found it time-consuming to answer critical thinking test questionnaire. The participants were in the 19-23 age group and included 26 male and 27 female subjects.

The listening comprehension texts used in the present research were adopted from Interchange Video Resource Book (Level 3), comprising a dialogue, a monologue, and an interview. For the comprehension test, a 20-item questionnaire consisting of 10 multiple-choice, 5 fill-in-the-blank, and 5 short answer items was designed (7 questions for each of the dialogue and monologue listening sections and 6 questions for interview). As for the reliability assessment, the questionnaire was administered in advance to a number of students with the same proficiency level as the participants. Using KR21 formula the reliability was estimated to be 0.70. The validity of the test was also investigated and it was found to be valid.

The Watson-Glaser Critical Thinking Appraisal (CTA) (Form A), with a reliability index of 0.78 (33), was used in this study.

This questionnaire comprises 80 items, with five subtests as follows: (A) Test 1. Inference: Judging the truth and falsehood of inferences drawn from given data (items 1-16); (B) Test 2: Recognizing Unstated Assumptions: Recognizing unstated assumptions or presuppositions in given statements or assertions (items 17-32); (C) Test 3: Deduction: Determining whether certain conclusions are the logical implications of the given statements or premises (33-48); (D) Test 4: Interpretation: Weighing evidence and deciding if generalizations or conclusions drawn from the given data are warranted (49-64); (E) Test 5: Evaluation of Arguments: Distinguishing between arguments that are strong and relevant and those that are weak or irrelevant to a particular question at hand (65-80). For each of these five tests, the following scoring procedure was employed: the correctness of the responses was determined based on the available scoring key. Afterwards, the correct responses was added up to calculate a total raw score. Then, these raw scores were converted to standardized scores based on the norm group tables (available from www.talentlens.co.uk). In each of the subtests, a higher score indicates a stronger disposition toward critical thinking in that area.

Total scores in both listening comprehension and critical thinking were calculated based on the number of correct answers, and there were no negative points for wrong answers. The data were analyzed using t-test for comparing students' comprehension in audio-only and audio-video listening tests and correlation coefficient was estimated in order to investigate the relationship between students' critical thinking score and listening comprehension in both tests. All the analyses were conducted using SPSS version 25.

The participants took part in a four-session program (12 hours in total). They were 53 students majoring in dentistry at Babol University of Medical Sciences which have been selected using convenience sampling procedure. Sampling was done based on the available English courses at the time in Babol dental school. All participants had already passed General English for Dentistry course and were studying two levels of Special English for Dentistry (Levels 1 and 2). Therefore, two different levels of English proficiency were assessed in this study. In total, 53 out of 69 students in both courses consented to take part in the study, since they expressed interest to know the results, specially their critical thinking scores. The other 16 students declined to participate as they found it time-consuming to complete the critical thinking questionnaire.

Participants were initially briefed on the test procedure and what was expected of them in each part. Then, three listening passages were administered and students were asked to listen carefully and then answer the questions related to each passage. For the pre-test, three passages were played by means of a computer system and a speaker. Students were given one minute to look at the questions before listening, and afterwards they had three minutes to answer the questions (7 questions for each of the dialogue and monologue sections and 6 questions for interview). A pretest-posttest design was employed with a 14-day interval to collect data for the present research.

In the posttest session, students watched the video and listened to audio simultaneously, but the procedure, timing, environment and the audio system were identical with the audio session. In the next stage, they were administered a California Critical Thinking Skills test and were allotted 40 minutes to answer the questions. Finally, Watson-Glaser Critical Thinking Appraisal (CTA) was used to measure the students' critical thinking abilities. It has been shown to be both valid and highly reliable with a reliability index of 0.78 (33)

Results

The total score in both listening comprehension and critical thinking were measured based on the number of correct answers and no negative points were given for wrong answers. The data were analyzed using

t-test for comparing students' comprehension in audio-only and video-audio listening tests. In this study the independent variables were the audio-only and audio-video passages used for evaluating listening comprehension, and students' performance and their test scores were the dependent variables. Based on an analysis of students' replies to 20 multiple-choice listening comprehension questions, audio-only treatment scored a mean of 9.43, and the audio-video treatment received a mean score of 12.06.

Based on the mean scores, it appears that the participants' level of comprehension was significantly higher in the audio-video listening test. Paired samples t-test was performed using SPSS (v.21) to compare the students' mean scores on the two listening tests. Table 1 illustrates the data related to the students' listening comprehension in audio-only and audio-video sessions.

Based on Table 1, there was a statistically significant difference between the students' performance in the two tests and their mean score was significantly higher in audio-video test compared to the audio-only test ($t=-9.030$, $df=52$, $P<0.05$).

The 2nd research question aimed to investigate the possibility of a significant correlation between students' performance in the two modes of presentation and their critical thinking abilities. For that purpose an analysis was conducted between the test scores. The results revealed a notable relationship between the students' performance in listening tests and their level of critical thinking. Given the results of the two tests, this relationship was found to be stronger in the audio-video test ($P=0.353$) than in the audio-only listening test ($P=0.313$).

Discussion

Based on the results, the students' comprehension levels were significantly higher in the audio-video listening test than in the audio-only test. There was also a significant but weak correlation between participants' performance in audio-only listening test and their critical thinking, but the correlation between audio-video test results and students' critical thinking was significant and strong. In other words, the students appeared to need more help in listening comprehension and the presented video provided sufficient information and cues, helping them understand the listening passages far better. This finding can also be related to students' different learning styles. The obtained results were consistent with some other studies (3, 6, 17-20, 22) where participants performed better in response to video-audio listening tests in comparison with audio-only tests.

Ginther (18) indicated that visuals facilitate performance when they contain information complementing the audio part. She went one step further by comparing context and content visuals, and found context visuals to be more helpful. Sweller (17) revealed that students were over 50% more creative in finding solutions to transfer problems when verbal and visual explanations were both available. He also concluded that learners actively select, organize, and integrate verbal and visual information, which is in agreement with the generative theory of multimedia learning. Sueyoshi and Hardison (21) compared audio-visual-gesture-face, audio-visual-face (no gestures), and audio-only listening tests in terms of their effect on students' listening

Table 1. Comparing students' listening comprehension in audio-only and audio-video sessions

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Audio-only listening test audio-video listening test	-2.62	2.11	0.29	-3.20	-2.03	-9.03	52	0.000

comprehension, and concluded that audio-visual-gesture-face displayed the best results. Sulaiman et al. (3) found that most students scored better when using video media method compared with the audio-only method. They concluded that using video as an assessment tool can help students comprehend better, as videos represent more "authentic, meaningful and real-life situation contexts and language" (3). The results of the present study were also consistent with those of Woottipong (6), which revealed that students had a positive attitude toward using video material and also gained better scores in audio-video listening test.

On the contrary, a number of studies reported that students performed better in audio-only tests and found visuals distracting and inefficient (7, 21, 25). Başal et al. (7), found that audio-only group displayed a significantly better performance in listening comprehension test. However, they noted that their findings were not conclusive, as different factors such as "motivation, physical factors, topic familiarity, note-taking habits, and initial preference for audio or video" (7), may affect the results, and further research is required to investigate the effect of these factors on students' performance. Conaim (21) and Suvorov (23) evaluated students' perspectives on audio-only and audio-video listening tests and compared their performances using these two forms of presentations. They concluded that while students mostly preferred video version, they performed better in the audio-only test.

In this study, a strong relationship was also observed between students' critical thinking and their performance in audio-video listening test, whereas the relationship between critical thinking and audio-only test results was weak. Little comparable research has been conducted in this area, especially in the domain of listening comprehension, but some studies demonstrated a significant relationship between critical thinking and other language learning abilities. Our results were in line with those of Bonk (34) and Walker (35), who argued that instructors should provide students with rich learning environments and diverse learning opportunities. This is reflected individual differences and diversity in our instructional design processes. Ahmadpour and Khaastehs' (36) study also indicated that critical thinking skills can directly affect the writing behaviors of the language learners. Kolour et al. (37) and Malmir & Shoorcheh (38) provided compelling evidence about the positive influence of critical thinking tasks on Iranian EFL learners' argumentative essay writing.

According to the results of the study, there are some suggested pedagogical implications for EFL teachers and learners. Audio-Video content appears to be an adequate tool when accompanied by different types of activities for teaching, testing and improving listening comprehension skills. Using videos in teaching and testing can help EFL students learn faster and better, and their learning will be more similar to the situations that they may encounter in real life. For language teachers, a visual element increases the opportunities for using any text in different types of classroom activities such as gap-filling, group discussion, and even oral presentation. It can be a rich and easily accessible source of ready-made teaching and testing materials, without the need for long preparations on the part of teachers. Based on the results, one should consider students' level of critical thinking as well, since audiovisual materials may prove more helpful in improving listening comprehension among students with higher critical thinking skills.

There were also some limitations in this study which should be considered in future studies in this area. Given the small sample size and time constraints, it was not possible to explore the reasons for the better comprehension of video presentation format. Also the students' better performance in the audio-video test could be partly attributed to their learning styles. Therefore it is recommended to group learners based on learning styles and conduct the same test to compare their performances. It is also advised that further research should be conducted on this subject with a focus on

students' perspectives and attitudes toward these two modes of presentations, using questionnaires and interviews. The results can improve teachers' knowledge regarding the use of proper materials in listening comprehension tests.

Based on previous research, exposing students to authentic materials helps them learn languages faster and better, and especially improve their listening comprehension. In most human contacts, auditory elements are accompanied by visual elements. It can be a good indicator for the necessity of using visual elements in teaching and testing listening comprehension skills and moving beyond the traditional practice of teaching and testing listening with audio-only texts. It is also suggested that students with higher critical thinking abilities can make better use of visual elements as an aid to comprehend what they hear simultaneously.

The findings in this study necessitate further assessment of the factors contributing to the learning process. Therefore, teachers as well as teacher educators need to take account of the fact that learners have diverse thinking abilities which would naturally affect the way they approach different learning tasks.

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Authors' Contributions

Study concept, design, and critical revision of the manuscript for important intellectual content were developed by the authors who participated in all stages of the research process.

Ethical Considerations

The proposal, the questionnaire, and the participant consent form were submitted to the Deputy of Research Committee of Babol University of Medical Sciences. All participants were fully aware of the nature and confidentiality of the study and were told in advance that the information provided by them would remain confidential. Entering the study was made possible for each participant by signing the consent form.

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Conflict of Interest

The author declares that they have no conflict of interests.

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