Empowering teacher education with jigsaw techniques: insights from language learners' listening tasks

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Developing a sustainable education requires consideration of social and psychological factors in the classroom. One such implementation is the jigsaw technique, a cooperative approach that is less frequently investigated. This study aimed to examine the effectiveness of jigsaw listening techniques in teaching advanced learners of English as a Foreign Language (EFL). Participants were divided into two groups: jigsaw group or diagnostic group. To achieve the objectives of the study, English listening tasks were administered to the participants once as both pre-tests and post-tests. Descriptive statistics from the pre-test results were used to evaluate the level of their homogeneity. Two series of paired samples t-tests were conducted using Statistical Package for the Social Sciences (SPSS) to investigate changes from pre-test to post-test after the intervention. The results indicated that both listening techniques were effective, but jigsaw techniques led to higher listening proficiency. By the end of the course, learners in the jigsaw group were more homogeneous. The findings suggest that high levels of social interactions among students contribute to improved instructional processes and play a crucial role in learning gains when using jigsaw techniques. Social skills, which are essential prerequisites for successful cooperation, require explicit teaching and development and can be promoted with jigsaw techniques in the classroom. This study introduced and developed seven jigsaw techniques that are significantly complementary to EFL classes.

KEYWORDS

jigsaw, diagnostic task, listening task, cooperative learning, teacher education

1 Introduction

Creating a collaborative classroom environment fosters engagement, enhances understanding, and promotes effective learning outcomes (Banaruee, 2024). Among various teaching techniques, the jigsaw technique is a novel approach to cooperative tasks in communicative language teaching (CLT). The jigsaw method, as a two-way task, has proven more effective than one-way tasks in improving EFL learners' writing skills (Banaruee, 2024). Previous research (e.g., Kurita, 2012) suggests that self-reflective listening strategies improve task performance. However, few studies have compared jigsaw techniques with diagnostic listening tasks in EFL classrooms. This study addresses that gap by evaluating both approaches' effectiveness in enhancing Iranian EFL learners' listening proficiency. It also provides step-by-step guidelines for implementing jigsaw listening tasks, offering practical insights for language teachers.

Listening is a fundamental yet often overlooked skill in EFL instruction despite its pivotal role in language acquisition (Richards, 2008). Traditionally, diagnostic listening tasks have

been widely used to assess learners' comprehension by providing controlled listening exercises, such as multiple-choice questions and fill-in-the-blank activities. However, these tasks often lack interactive and communicative elements, which are essential for developing real-world listening skills. In contrast, the jigsaw technique encourages cooperative learning by dividing listening content among learners, requiring them to collaborate, reconstruct meaning, and communicate actively to complete a given task (Banaruee et al., 2022). While research has demonstrated that cooperative learning fosters social interaction, learner autonomy, and deeper cognitive processing (Zare-Behtash and Banaruee, 2017), the extent to which jigsaw listening enhances listening proficiency compared to diagnostic tasks remains underexplored. This study investigates this comparison by assessing learners' listening performance in both conditions, contributing empirical evidence to the field of language pedagogy.

Jigsaw techniques incorporate psychology-based cooperative learning strategies that enhance both academic performance and psychosocial factors. Originally designed to reduce intergroup conflict and promote empathy, the method also boosts self-esteem and self-evaluations. Dividing lesson content and fostering structured group interactions strengthen intergroup relationships and student wellbeing. Effective implementation requires teachers to be creative, active, and pedagogically skilled. Research links the jigsaw method to psychological constructs such as self-efficacy, self-concept, and perceived competence, showing advantages over traditional methods. Vandergrift (2004) emphasized that listening proficiency develops through learning how to listen, highlighting the need for engaging, effective instruction and skilled teachers.

Additionally, the method's impact on students' academic self-confidence and self-evaluations reflects its psychological implications in educational settings. Jigsaw techniques influence students' cognitive processes, social interactions, and emotional experiences within the learning environment. They contribute to the teaching and learning process within a cooperative teaching-learning style (Banaruee et al., 2022). Within this cooperative paradigm, the teacher becomes a facilitating resource person and shares the learning and teaching process with students instead of being the sole resource. Rather than lecturing, the teacher facilitates mutual learning, requiring each student to be an active participant and responsible for their learning (Aronson and Patnoe, 2011). Learners must be involved and responsible for their learning, and they must be reciprocally facilitative while interacting with each other, rather than relying on teachers to lecture.

Achieving full linguistic proficiency requires the integration of multiple factors. Since language output begins with input, listening plays a crucial role in language acquisition (Banaruee et al., 2023a). However, despite its importance, listening remains underutilized in EFL classes. As the primary source of language input (Richards, 2008), teaching listening poses challenges. In jigsaw classes, instructors should ensure that groups include both stronger and weaker students, allowing weaker learners to participate actively and seek support. Emphasizing cooperation and shared responsibility, the jigsaw method requires each member's contribution to group success, increasing student engagement. Today, jigsaw represents both cooperative and task-based learning.

Early perspectives on listening prioritized language content before shifting to a skills-based approach, raising concerns about the real-life relevance of classroom listening. This shift emphasized

inferring word meanings, using authentic recordings, incorporating conversational features, and employing simulated tasks over formal exercises (Field, 1998). Cooperative learning fosters self and peer correction, making students active participants in their learning (Banaruee, 2016). Kohennen (1992) identified five key benefits of cooperative learning: positive interdependence, individual accountability, face-to-face interaction, social skills, and team reflection. Listening is now viewed beyond linguistics, incorporating cultural context, discourse cues, and pragmatic conventions (Hinkel, 2006). Teachers must activate students' schemata for effective learning. Modern education trends prioritize student-centered learning over passive, lecture-based methods (Mirici, 2005; Davis and Wilcock, 2005), emphasizing active participation and responsibility.

The jigsaw technique aims to help students transfer knowledge, promoting interdependence and strategic teaching within groups (Brown, 2001). Traditional methods often lack deep understanding, whereas self-directed learning supports reflection and evaluation (Vandergrift and Goh, 2012). Assessing learners' perceptions of L2 listening can improve teaching effectiveness (Lotfi, 2012). Although jigsaw techniques are widely used in reading and writing (Aronson and Patnoe, 2011), their application in listening remains underexplored. This study enhances jigsaw listening with multimedia, visual aids, and interactive discussions, incorporating visual sequencing, note-sharing, and peer explanations for a more engaging experience.

Theoretically, this research extends cooperative learning and task-based instruction by examining peer interaction's role in listening development. Psychosocial benefits, including increased self-confidence, self-efficacy, and motivation, are well-documented (Sahin, 2010), but this study explores their impact on listening comprehension. Pedagogically, it offers insights for curriculum designers, teacher trainers, and educators, demonstrating the effectiveness of interactive, learner-centered listening instruction. The structured framework provides a replicable model for implementing jigsaw listening in EFL classrooms.

2 Review of the related literature

Since the 1980s, cooperative learning has emerged as an alternative to traditional teacher-led instruction, also known as lecturing or passive learning (Johnson et al., 1981; Roseth et al., 2008; Springer et al., 1999). Among its various methods, the jigsaw classroom (Aronson et al., 1978) has been widely promoted over the past 40 years. Originally designed to reduce racial conflict in desegregated U.S. schools and enhance academic learning, the jigsaw method divides students into small, diverse groups. Each member becomes an expert on a lesson segment, collaborates in "expert groups," and then shares their knowledge with their original group, ensuring that every student's contribution is essential to understanding the whole lesson.

The jigsaw method fosters collaboration, individual achievement, and positive self-evaluations. However, empirical research on its effectiveness remains limited, with mixed findings casting doubt on its impact (Bratt, 2008; Hornby, 2009; Roseth et al., 2019). While substantial research has examined its efficacy in reading and writing instruction, studies on jigsaw techniques in listening and speaking,

critical components of language input and output, are lacking. Greater attention is necessary for jigsaw listening research.

Aronson developed jigsaw to create cooperative tasks that require each student to contribute equally to the group's success. Aronson and Patnoe (2011) emphasized that jigsaw activities foster interdependence, motivating learners to support one another. With the rise of task-based and cooperative learning, teaching has shifted from passive knowledge transmission to active skill development.

The jigsaw technique is a cooperative learning approach designed to reduce racial conflict, enhance learning outcomes, boost motivation, and increase student engagement (Slavin, 1983). In this method, students become "experts" on specific content and share their knowledge with peers. While numerous studies have examined collaborative learning (Andrews and Rapp, 2015; Slavin, 2012), fewer have focused specifically on the jigsaw method. Variations of the jigsaw technique exist. Stahl (1994) introduced a quiz after the expert phase to ensure comprehension, though this version remains underexplored (Şahin, 2011). Holliday (2000) incorporated teacher-led content introductions, quizzes after both phases, and an optional reteaching session (Jansoon et al., 2008). Evidence suggests jigsaw learning benefits EFL achievement, with four out of five studies reporting positive effects (Evcim and İpek, 2013). However, research outcomes are mixed due to methodological limitations and student challenges related to cultural and cognitive factors.

Cooperative learning methods are uncommon in many traditional classrooms, leading to difficulties in student adaptation (Sagsoz et al., 2017). A lack of cooperation skills—such as coordination and communication—further hinders success (Arslan, 2016). Studies show that providing collaboration guidelines before group work improves performance and reduces cognitive load (Zambrano et al., 2023). Preparing students for cooperation through skill development (Buchs and Butera, 2015) and emphasizing its value (Buchs et al., 2016) enhances learning outcomes. While cooperative tasks can increase perceived cognitive load (Moreno, 2009), distributing task demands can reduce strain over time (Nebel et al., 2017). For effective language acquisition, comprehensible input is essential. Krashen (2009) argues that only comprehensible input is necessary for language learning. Rost (1991) describes listening as an active, engaged process where attention aids in accurate reproduction. Banaruee et al. (2017) highlight how jigsaw tasks allow teachers to adapt techniques to learner preferences and integrate skill development. Listening is not an isolated skill—it facilitates understanding and social interaction, enabling meaningful communication.

This passage highlights the effectiveness of the jigsaw technique in improving listening comprehension and overall academic success in EFL classrooms. Research suggests that inadequate instructional materials and insufficient teacher training in listening strategies contribute to poor listening skills (Victoria, 1997). Several intervention strategies have been identified, including teacher modeling, direct instruction, guided practice, metacognitive reflections, and the integration of listening skills into content areas. Setting a clear purpose for listening has proven to be one of the most effective strategies for enhancing listening skills.

Numerous studies affirm the effectiveness of jigsaw listening. Sahin (2010) found that jigsaw techniques promote active student involvement and lead to better learning outcomes. Similarly, Banaruee and Askari (2016) reported that learners engaged in cooperative tasks such as jigsaw experienced fewer difficulties in the learning process.

Kazemi (2012) demonstrated that students taught through the jigsaw method scored higher on post-tests, indicating improved reading achievement. Similarly, Zakiyah (2010) observed that cooperative learning via jigsaw enhanced students' reading comprehension. The success of jigsaw learning can be attributed to the collaborative nature of the method. Sahin (2010) explained that students in jigsaw groups outperform those in traditional settings because they take responsibility for their learning, engage in peer teaching, and actively participate in discussions. However, the effectiveness of the method depends on proper implementation, as inappropriate tasks may discourage learners. Yousif (2006) emphasized the importance of addressing psychological barriers, speech rate, and pacing in listening activities, advocating for chunked exercises to maintain engagement. Yasin (2009) found that many teachers fail to utilize diverse listening strategies, leading to student disengagement.

Tewksbury (2008) recognized jigsaw as an effective cooperative learning model that fosters comprehension and teamwork. Arnold (1999) noted that jigsaw techniques create meaningful learning opportunities and motivate students to participate. Howatt and Dakin (1974) defined listening as the ability to comprehend spoken language, and Tam (1997) stressed the need for frequent speaking tasks to improve fluency. Abbasian and Ghenabi (2016) compared jigsaw and decision-making tasks, concluding that jigsaw techniques resulted in greater listening and speaking improvements. Khoshsima and Banaruee (2017) found that corrective feedback in jigsaw activities enhanced language intake. Finally, reported a significant positive impact of jigsaw learning on students' academic achievement and listening comprehension. These findings collectively underscore the value of jigsaw listening techniques in EFL instruction, advocating for their integration into language curricula to foster engagement, collaboration, and improved listening skills.

3 Methods

3.1 Design

This study took advantage of a quantitative, quasi-experimental research design with a pre-test–treatment–post-test structure. Two groups were non-randomly assigned in intact classes. Each class consisted of 20 EFL learners at an advanced level. Listening was one of the skills worked through the course and was done every session for 3 months.

Both groups were given a pre-test to be measured before the program to approve the homogeneity of the two groups under study; afterward, treatment was given to both groups. Jigsaw techniques were provided in one of the two classes in a way as the teacher taught listening using a diversity of jigsaw techniques: Flash Card Jigsaw, Summative Jigsaw, and One-to-One Jigsaw, and the control group practiced the Diagnostic Approach exercise: Filling the Gap, Picture Guessing, Rearranging Sentences, and Matching as the convention methodologies of language centers in Iran. Finally, both groups were measured after the program, and quantitative data were collected through post-test. Post-test was a type of International English Language Testing System (IELTS) Academic Listening Task administered to the learners.

The focus of this study was to provide a better view of how utilizing classroom activities could be beneficial in EFL listening

classes. This needed meticulous attention and control of the procedure, so the researchers took a principal role and participated as teacher assistants in both the control and the experimental groups and observed all the processes to be in line with the methodology and the design of the study; finally, all the collected data were analyzed and documented.

3.2 Participants

The participants of this study were 40 Iranian EFL learners, all male, selected through convenience sampling from advanced-level classes at the Iran Language Institute. To ensure a fair comparison, participants were randomly assigned to either the experimental or control group. Each group consisted of 20 learners, with comparable distributions in terms of age (16 to 30 years old), proficiency level, and other relevant characteristics. The experimental group received jigsaw techniques as the treatment, while the control group practiced diagnostic listening tasks. All 40 participants were confirmed to be at the same proficiency level based on the institute's placement system. Additionally, their homogeneity was verified through the pre-test scores, ensuring no significant differences between groups before the intervention. To ensure the validity and reliability of the pre- and post-tests, we conducted a pilot study with a separate group of learners ($N = 12$) to assess the clarity and appropriateness of the test instruments. The reliability of the tests was measured using Cronbach's alpha, which yielded a coefficient of $\alpha = 0.85$, indicating a high level of internal consistency. These steps ensured that the assessment tools accurately measured the learners' listening proficiency before and after the intervention.

3.3 Instrumentation

Instruments optimized for the purpose of this study were a pre-test and a listening task of IELTS to assure the level of the students before they receive treatments. For the post-test, another listening task of IELTS was given to distinguish whether the learners had gained any knowledge due to the delivery of the treatments or not.

3.4 Data collection procedure

3.4.1 Jigsaw group procedure

The classes were held twice a week for 3 months, and the learners participated actively throughout the term. Practical constraints, such as the availability of participants and scheduling within an academic term, influenced the decision. While we acknowledge that a longer duration could potentially provide more robust results, we believe that the chosen timeframe allows for a meaningful assessment of the intervention's impact, given the context and resources available. Every course's duration was 21 sessions within a period of 3 months. Seven jigsaw techniques were employed in this study, which are explained in detail in the following sections.

3.4.1.1 Jigsaw technique A

In this version of the jigsaw technique, the students engage in an active listening activity complemented by visual aids. This method

fosters collaboration, encourages detailed listening, and enhances comprehension through peer interaction. The students listened to the same listening track for 1 min. Then, they looked at some cards/pictures and discussed what they had listened. The pictures were sequentially designed with specific parts bolded by colors to be noticed by the card keepers as picture clues, which indicated this part was also mentioned in the track.

3.4.1.1.1 Step 1: initial listening task

The participants listen to a 1 min audio track. The audio content is chosen to align with the learning objectives and provide relevant information for subsequent analysis. During this phase, students are instructed to listen carefully to the entire track without interruption.

3.4.1.1.2 Step 2: visual aids and picture cards

After listening to the track, students are presented with a set of picture cards that visually represent specific segments or elements of the listening passage. The cards are sequentially designed, with particular details emphasized through the use of bold colors or highlighted features. These visual cues are meant to guide students' attention to specific parts of the track, facilitating recognition of key concepts.

3.4.1.1.3 Step 3: group discussion and reflection

In this phase, students engage in a group discussion to share their interpretations of the listening material based on the picture clues provided. Card holders lead the discussion by referring to their designated picture cards and describing what they believe corresponds to the audio content. Each card is linked to a distinct part of the track, and the discussion focuses on the connections between the pictures and the listening content. The color-coded or bolded sections on the cards are meant to highlight the most significant aspects of the listening material, which are also mentioned in the track.

3.4.1.1.4 Step 4: collaborative synthesis

The final phase involves a collaborative effort where students combine the information from their individual cards to reconstruct the entire listening track. Through cooperative dialogue, they piece together the content, filling in gaps in their understanding. The process encourages learners to develop a comprehensive interpretation of the audio by integrating various perspectives and refining their listening skills.

3.4.1.2 Jigsaw technique B

In this version of the jigsaw technique, learners are divided into small groups and engage in a multi-track listening activity. This method emphasizes individual responsibility, note-taking, and collaborative synthesis to foster a deeper understanding of the listening material. The class was divided into five groups of four learners. Then, the teacher played four listening tracks. The learners in each group were supposed to take notes regarding one track in particular. For instance, learners who were number one in each group took notes from track number one, number two learners from the second track, and so on to the end. When the listening was over, every learner explained his part to his partners. Then, the learners stood up and started telling their listening tracks one by one, and all learners put their sentences together to complement and complete each other's sentences.

3.4.1.2.1 Step 1: group division and track assignment

The class is divided into five groups, each consisting of four learners. Each group is assigned a specific listening track, ensuring that each learner within a group is responsible for a distinct part of the activity. For example, students who are designated as Learner 1 in each group will take notes on Track 1, Learner 2 on Track 2, and so on until all four tracks have been assigned. The teacher plays the four listening tracks, one after the other, giving each student time to take detailed notes on the content of their respective track.

3.4.1.2.2 Step 2: individual note-taking and listening

Each learner listens to their assigned track and takes notes on the key points, details, and any other relevant information. The emphasis during this phase is on active listening, where students must focus on extracting critical details from the audio material. Note-taking is essential for later phases of the activity, as it will serve as the basis for group discussions.

3.4.1.2.3 Step 3: group discussion and explanation

After all the tracks have been played, each learner shares the notes they took on their assigned track with their group members. This phase promotes peer teaching as each student explains their portion of the listening material. The group members listen attentively and ask questions to ensure they understand the content and context of each track.

3.4.1.2.4 Step 4: synthesis and collaborative completion

In the final stage of the activity, the learners stand up and, in turn, present the main points from their assigned listening track to the rest of the class. As each learner presents their track, the rest of the class listens carefully and seeks to complement and complete the information presented. Students are encouraged to build upon each other's sentences and ideas, collaborating to form a cohesive narrative or complete understanding of the entire listening material. The group's collective knowledge expands as students exchange details, filling in gaps and enhancing the overall comprehension of the listening task.

3.4.1.3 Jigsaw technique C

This version of the jigsaw technique is designed for paired listening activities with a focus on listening to different segments of the same audio. The technique emphasizes collaboration and synthesis as learners work together to combine information and share their insights with the whole class. The class was divided into two groups, each sitting by their partner's side. This exercise was done in a laboratory, so the learners took advantage of headphones and laboratory systems. The teacher played two pieces of news in a way that half of the learners listened to the initiative part of the news and the other half listened to the ending part. The teacher asked the partners to put their information together, and finally, one of them stood up and expressed themselves to the class.

3.4.1.3.1 Step 1: group division and pairing

The class is divided into two groups, with each learner paired with a partner. The pairs are seated together, ensuring that they can work closely with one another. This activity is conducted in a laboratory setting where each learner has access to headphones and the laboratory's audio systems, allowing for focused and individualized listening.

3.4.1.3.2 Step 2: listening to different parts of the audio

The teacher plays two news segments, ensuring that each segment covers distinct parts of the story. The learners are divided so that:

Half of the learners listen to the beginning of the news segment, and

The other half listens to the ending of the news segment.

This division allows learners to focus on different segments of the same content, promoting individual responsibility and encouraging careful listening.

3.4.1.3.3 Step 3: information sharing and synthesis

After listening, the partners combine their notes and share the information they gathered from their respective segments. Each pair collaborates to reconstruct the full story by discussing and filling in any gaps in the information they gathered. The goal is for each pair to arrive at a comprehensive understanding of the entire news piece by merging the beginning and ending segments.

3.4.1.3.4 Step 4: presentation to the class

Finally, one member of each pair stands up and presents the combined information to the class. They share the full story, incorporating both the beginning and ending sections of the news segment. This presentation allows for the final synthesis of the listening task, where learners collectively piece together their understanding of the entire audio.

3.4.1.4 Jigsaw technique D

This version of the jigsaw technique focuses on active listening and language structure. It emphasizes the identification and use of key vocabulary from the listening track, with learners collaboratively reconstructing the story by completing missing parts based on the words provided. The teacher played a listening track and started writing some words on the whiteboard. Most of the words were loading words such as nouns, verbs, adjectives, adverbs, and, in phrasal verbs, the particle. The words were in sequence, and the learners were supposed to complete the whole story.

3.4.1.4.1 Step 1: listening and vocabulary identification

The teacher plays a listening track that contains a story or narrative. While the students are listening to the audio, the teacher writes specific key vocabulary words on the whiteboard. These words primarily consist of loading words such as nouns, verbs, adjectives, adverbs, and phrasal verb particles. The words are written in sequential order, following the natural flow of the audio track.

3.4.1.4.2 Step 2: vocabulary analysis and gap completion

As the audio plays, students pay attention to the words written on the whiteboard. These words represent important elements of the story and function as clues for learners to understand the unfolding narrative. The learners are tasked with completing the missing parts of the story by filling in the gaps based on the words on the board. They must use contextual clues and their understanding of the narrative to figure out how the words fit into the larger context.

3.4.1.4.3 Step 3: group collaboration and story reconstruction

After listening to the track and reviewing the words on the board, students are encouraged to work together in pairs or small groups to reconstruct the full story. By discussing and brainstorming, learners

share their ideas and complete the story, using the vocabulary on the whiteboard and their collective understanding of the narrative. This stage emphasizes collaborative problem-solving and reinforces comprehension skills.

3.4.1.4.4 Step 4: full story presentation and reflection

Once the group has reconstructed the story, a representative from each group presents the completed narrative to the class. The teacher facilitates a whole-class discussion where students compare their reconstructed versions of the story, providing opportunities for error correction, clarification, and further analysis of the vocabulary and language structures used. This final presentation allows students to solidify their understanding of the listening material and apply the vocabulary in context.

3.4.1.5 Jigsaw technique E

This version of the jigsaw technique promotes active listening and sequencing skills. By focusing on key vocabulary and expressions from the listening track, students work collaboratively to put scrambled information in the correct order and retell the story. The teacher played the audio track, and while the students were listening to the track, he wrote some keywords and expressions related to the actions in the listening on the whiteboard but not sequentially, yet in a scrambled fashion. Then, he asked the learners to put the expressions in order and retell the story.

3.4.1.5.1 Step 1: listening and vocabulary identification

The teacher plays an audio track that contains a story or narrative. As the students listen, the teacher writes a series of keywords and expressions related to the actions and events in the track on the whiteboard. These words are scrambled, meaning they are not written in the sequential order in which they appear in the listening track.

3.4.1.5.2 Step 2: listening for comprehension

While the audio track plays, students focus on understanding the narrative and identifying the key actions and events. As they listen, they observe the words and expressions being written on the whiteboard, which are intended to represent significant parts of the track.

3.4.1.5.3 Step 3: group collaboration to sequence expressions

After listening to the track, the teacher instructs the students to work together in pairs or small groups to organize the scrambled words and expressions into a logical sequence that aligns with the events in the story. This phase encourages collaborative problem-solving, where students must use their comprehension skills and knowledge of the narrative to order the words correctly and retell the story.

3.4.1.5.4 Step 4: retelling the story

Once the group has successfully arranged the words in the correct order, students retell the story based on the sequence they have created. Each group member can take turns narrating different parts of the story or the group can present the completed version collectively. This stage provides students with an opportunity to demonstrate their understanding of the track and apply the key vocabulary and expressions in context.

3.4.1.5.5 Step 5: whole-class discussion and comparison

Following the group retelling, the teacher can facilitate a whole-class discussion to compare the different sequences and retellings. This allows for error correction and a deeper understanding of the story's structure. Students can discuss how the order of events affects the overall narrative and reflect on how the keywords and expressions shaped their understanding of the track.

3.4.1.6 Jigsaw technique F

This version of the jigsaw technique focuses on listening for specific details and sentence completion, requiring students to engage in both active listening and critical thinking to identify missing parts of sentences. The technique encourages collaborative participation and offers opportunities for students to generate alternative responses based on their understanding of the audio. As the teacher played the track, they started writing the initiative parts of some sentences on the whiteboard. The sound track was played completely. Then, the learners were asked to listen again and find out the ending sections. All learners were actively involved, and even more alternatives to the sound track answers were produced meanwhile.

3.4.1.6.1 Step 1: listening and sentence initiation

The teacher begins by playing the audio track, which contains a narrative or dialogue. While the audio is playing, the teacher writes the initial parts of several sentences on the whiteboard. These initial segments typically convey the start of key ideas or events, leaving the ending parts of the sentences incomplete. The incomplete sentences act as clues for the learners to figure out the missing information.

3.4.1.6.2 Step 2: full listening

The audio track is played in its entirety, allowing the students to focus on understanding the full context of the sentences. During this listening phase, students observe the partial sentences written on the board, paying attention to the content that follows in the track to identify the missing ending segments.

3.4.1.6.3 Step 3: re-listening and completion of sentences

After the track has been played once, the students are asked to listen to the audio again. This time, their goal is to complete the sentences by identifying the ending sections based on the information provided in the track. Each learner is encouraged to actively participate in this process, focusing on the specific missing details and how they logically complete the sentence.

3.4.1.6.4 Step 4: student collaboration and discussion

As students listen to the track again, they may generate multiple possible alternatives for the ending parts of the sentences, depending on their interpretation of the audio. This phase encourages active involvement from all learners as they discuss their interpretations with their peers, refining their answers through collaborative dialogue. The alternative answers may arise from differences in perception, highlighting the complexity of the listening material and allowing for a more dynamic learning experience.

3.4.1.6.5 Step 5: final synthesis and class sharing

Once the learners have completed the sentences, the teacher facilitates a whole-class discussion, where students share their answers and reflect on the possible alternatives they proposed. This stage

allows for error correction and the exploration of different audio interpretations. By comparing and contrasting the sentences completed by different students, the class gains a fuller understanding of the track and the language used.

3.4.1.7 Jigsaw technique G

This jigsaw technique focuses on sentence completion, but in this case, the teacher provides the ending parts of sentences, and students are tasked with identifying and creating the beginning sections. The technique emphasizes critical thinking, active involvement, and the generation of alternative responses based on the content of the audio. The teacher wrote the ending part of the sentences and asked the learners to write the initiative sections. These were repeated three times. Similar to exercise number three, all learners were actively involved, and even more alternatives to the sound track answers were produced in this task, too.

3.4.1.7.1 Step 1: sentence initiation by teacher

The teacher begins by writing the ending parts of several sentences on the whiteboard without providing the initial parts. These endings are based on key points or ideas from the audio track. The learners' task is to complete the sentences by creating appropriate starting sections that logically lead to the endings provided.

3.4.1.7.2 Step 2: listening to the audio

The teacher plays the audio track in its entirety, ensuring that the learners have enough context to identify and create the beginning sections of the sentences. While listening, students focus on the overall content of the track, analyzing the context to fill in the gaps created by the teacher's sentence endings.

3.4.1.7.3 Step 3: active student participation and sentence creation

After the audio has been played, learners are asked to write the beginning parts of the sentences corresponding to the endings on the board. This requires active listening and understanding how the information in the track can be logically structured into sentences. Students may generate multiple possible alternative answers, allowing for flexibility in how they interpret the content.

3.4.1.7.4 Step 4: collaboration and generation of alternatives

Similar to the previous jigsaw techniques, students are encouraged to collaborate with their peers, sharing ideas and discussing their choices for sentence beginnings. This collaborative environment fosters deeper engagement and critical thinking as learners compare their answers and explore different ways of completing the sentences. Multiple alternatives to sentence beginnings may emerge, showcasing the diversity of student interpretations and insights.

3.4.1.7.5 Step 5: class-wide review and reflection

Once all students have written their sentence beginnings, the teacher leads a whole-class review where students present their answers. The class discusses the different alternatives generated, allowing for an exploration of how the ending parts can be initiated. The teacher provides correction and clarification as needed, ensuring that the learners understand the correct grammatical structures and contextual appropriateness of their sentence creations.

3.4.2 Control group procedure

Three diagnostic listening tasks were employed in the control group condition, which are explained in detail.

3.4.2.1 Diagnostic listening task A

The diagnostic listening task focuses students' attention on listening comprehension and information extraction. In this task, students listen to a narrative where individuals discuss stressful situations and their solutions. The task emphasizes identifying key details and structuring information based on the given content. (A) The task is instructed as five people are talking about stressful situations they have had in their lives. Students have to listen and complete the chart provided. Students doing this exercise only write down the reason for the stress and the solution to this situation in front of the names given.

3.4.2.1.1 Step 1: introduction to the task

The teacher introduces the task by explaining the context: five individuals are talking about stressful situations they have experienced in their lives. The students are informed that they will need to listen carefully and extract specific information regarding the cause of stress and the solutions these individuals use to address their stressful situations. The teacher provides the chart template that students will use to record their answers.

3.4.2.1.2 Step 2: listening to the audio

The teacher plays the audio track where the five individuals discuss their stressful experiences. The students are asked to focus on the reason for the stress and the solution provided by each individual. The listening task is designed so students can follow the dialogue and extract the required information as they hear it.

3.4.2.1.3 Step 3: chart completion

As the students listen to the audio, they are instructed to complete the chart provided, which has the names of the individuals on the left side and two columns for each person: one for the reason for stress and one for the solution. Students will write the specific information corresponding to each individual's stressful situation and how they resolved it. The task encourages students to focus on details, reinforcing their ability to extract relevant content from a spoken narrative.

3.4.2.1.4 Step 4: post-listening review and discussion

Once the students have completed their charts, the teacher facilitates a whole-class discussion. During this phase, students compare the information they have written down and share their answers with the class. The teacher may prompt the students to elaborate on certain points, offering a chance to reflect on the strategies individuals used to cope with stress and how these strategies relate to real-life situations. This review also provides an opportunity for students to practice active listening and information retrieval from the audio.

3.4.2.1.5 Step 5: reflection and error correction

Finally, the teacher provides feedback on the task. The class can discuss any discrepancies in their answers or difficulties they encountered while completing the task. The teacher may also offer correction for any misunderstandings or misinterpretations of the

listening content. This phase ensures that students fully comprehend the information from the listening track and refine their listening skills.

3.4.2.2 Diagnostic listening task B

This listening section is multiple choice items, instructed as: Read the statements below. Listen again. Then, circle the best answer. Compare your answers with those of another student. In this section, there are some fill-in-the-blanks items and some options available in which no interaction and communication occurred among the learners. This diagnostic listening task is designed to assess students' listening comprehension through multiple-choice and fill-in-the-blank questions. The task emphasizes individual listening and response selection without interaction or communication between learners, encouraging independent critical thinking and information retrieval from the listening material.

3.4.2.2.1 Step 1: introduction to the task

The teacher introduces the task, explaining that students listen to an audio track with multiple-choice and fill-in-the-blank items. Students are instructed to carefully read the statements provided before listening to the audio. The teacher emphasizes that they should listen attentively and circle the best possible answer for each question.

3.4.2.2.2 Step 2: listening to the audio

The teacher plays the audio track which contains the necessary information for completing the multiple-choice and fill-in-the-blank items. Students focus on the content, paying attention to the details and context of the audio, as the questions require them to extract specific information from what they hear.

3.4.2.2.3 Step 3: answering the questions

After listening to the audio, students are asked to respond to the multiple-choice items by selecting the best answer and completing the fill-in-the-blank sections based on their understanding of the audio. Since the task is designed for individual work, students are not expected to interact or collaborate with each other at this stage.

3.4.2.2.4 Step 4: comparing answers

Once all students have completed the task, they are instructed to compare their answers with a peer. This peer comparison allows students to reflect on their choices, consider different perspectives, and ensure their answers are as accurate as possible. While there is no direct communication required in the previous steps, this phase gives learners the opportunity to discuss their responses and clear up any misunderstandings.

3.4.2.2.5 Step 5: review and discussion

The teacher facilitates a class-wide review of the answers, offering the opportunity to discuss the reasoning behind the correct choices. During this review, the teacher may explain the correct answers and address any common errors. This step ensures that students understand the material they listened to and can reflect on the listening process in a more structured way.

3.4.2.2.6 Step 6: reflection and error correction

Finally, the teacher provides feedback on the overall task, highlighting any challenges students faced and correcting any errors in their responses. The teacher may also discuss strategies for

improving listening comprehension based on students' performance in the task.

3.4.2.3 Diagnostic listening task C

Listen and complete the summary. In this part, 10 words were omitted from the text, which was almost predictable to be done in advance or after the audio tracks were played. The cooperation and interaction were missed in a way that the learners took the exercise for granted and were bored. This diagnostic listening task involves completing a summary by filling in omitted words from an audio track. The task is designed to test students' listening comprehension and ability to predict missing information based on contextual understanding. The exercise, however, lacks interaction and cooperative learning elements, which may affect student engagement.

3.4.2.3.1 Step 1: introduction to the task

The teacher introduces the task by explaining that the students will listen to an audio track and then complete a summary. The summary contains 10 missing words, and students are expected to fill in the gaps using their understanding of the listening material. The teacher emphasizes that the missing words are predictable, and students should listen attentively to the context of the audio to help them identify these gaps.

3.4.2.3.2 Step 2: listening to the audio

The teacher plays the audio track, which provides the necessary information to complete the summary. As students listen, they focus on the overall meaning of the track and attempt to predict which words are missing based on the content and context. The task involves using contextual clues from the audio to make inferences about the missing words.

3.4.2.3.3 Step 3: completing the summary

After listening to the audio, students are given time to complete the summary by filling in the 10 missing words. These words are generally predictable based on their understanding of the text, either from knowledge of the topic or from cues in the audio. Students are expected to work independently, using their ability to process the spoken information and apply it to the written summary.

3.4.2.3.4 Step 4: lack of interaction and engagement

One notable feature of this task is the lack of cooperation and interaction among learners. Students complete the exercise individually without the opportunity to collaborate or discuss the material. As a result, some learners may find the task predictable and monotonous, leading to a sense of boredom or disengagement. The absence of cooperative elements may reduce the potential for deeper learning or peer-based support.

3.4.2.3.5 Step 5: review and feedback

Once students have completed the summary, the teacher facilitates a class-wide review of the correct answers. The teacher reviews the 10 missing words, providing clarification and feedback where necessary. The class may discuss the context of the words that were omitted, as well as strategies for predicting missing information in future listening exercises.

3.4.2.3.6 Step 6: reflection and improvement

After the review, the teacher reflects on the overall task and provides feedback about the students' engagement and performance. The teacher may suggest strategies for staying engaged during listening tasks, such as focusing on keywords and listening for context clues. The teacher also notes the absence of collaborative interaction in this task and the potential benefits of adding more dynamic elements to future exercises.

4 Data analysis

Since this study enjoyed a pre-test–treatment–post-test design, a series of paired t-test samples was used to evaluate whether the participants had developed listening skills due to the listening type they received. The first paired t-test was done to investigate the difference in mean scores of the pre-test and post-test for the control (diagnostic) group. The second paired t-test was used to compare the mean scores of the pre-test and post-test of the experimental group (jigsaw group).

4.1 Descriptive statistics

Descriptive statistics was done on the pre-test results gained from the participants, which is represented in the table below.

For the "Diagnostic pre-test," the lowest score was 4.5 and the highest score was 6. Similarly, for the "Jigsaw pre-test," the range was also from 4.5 to 6. For the "Diagnostic pre-test," the mean score was approximately 5.28, while for the "Jigsaw pre-test," it was around 5.25. The results given in Table 1 indicated that the difference between the means obtained by the control and the experimental (jigsaw) groups is 0.12, and because the p-value is greater than 0.05 ($p > 0.005$), the assumption that the means of the scores obtained on the pre-test by both groups are not statistically significantly different is accepted.

That is to say, one can conclude that in terms of their ability to use the listening techniques, which was the target structure of the study, the students in groups A and B, as they were named the control (diagnostic) and experimental (jigsaw) group, respectively, were not significantly different. To put it another way, the table above shows that the mean score attained from the pre-test listening scores between the control group and the experimental group is very close and indicates their homogeneity.

4.2 Inferential statistics

To answer the research questions of the current study, the researcher applied the following data analysis.

4.2.1 Research question one

We investigated to see whether the jigsaw technique is effective in improving the listening proficiency of advanced EFL learners. For the "Diagnostic pre-test," the average score was approximately 5.28, with a standard deviation of approximately 0.38. Similarly, the "Jigsaw pre-test" group had an average score of approximately 5.25, with a standard deviation of approximately 0.38. Additionally, a paired samples analysis was conducted for the "Jigsaw pre-test" and "Jigsaw post-test" scores. The mean score before the intervention (pre-test) was 5.25, while the mean score after the intervention (post-test) increased to 5.93. The difference between the pre- and post-test means is 0.67. Further statistical analysis, such as a paired samples t-test, would be necessary to determine whether this difference is statistically significant.

Table 2 presents the paired samples t-test results for the jigsaw group. The mean difference between the pre-test and post-test scores was -0.68 (SD = 0.29), and the 95% confidence interval for this difference ranged from -0.81 to -0.54. The t-test results indicate a statistically significant improvement in listening proficiency, $t(19) = -10.28$, $p < 0.001$.

To further assess the magnitude of the effect, we calculated Cohen's d, which was d = 2.30, indicating a very large effect. These findings suggest that the jigsaw technique had a substantial impact on the students' listening proficiency development. The significant difference ($p = 0.000$) between the pre-test and post-test scores confirms that participants in the jigsaw group demonstrated improved performance in the post-test listening task.

4.2.2 Research question two

We studied whether jigsaw listening techniques are more effective than the diagnostic techniques in EFL learners' listening development. The means of the scores obtained by the control group (diagnostic) on the pre-test was 5.30, and that of the post-test was 5.62. The difference between the pre-test mean and post-test mean for the control group was 0.32. As P is greater than 0.5 ($p > 0.005$), the difference between the mean of the pre-test and that of the post-test is statistically significant. Based on this data, we can conclude that it is possible that the students in the control group have experienced significant improvement in their performance on the target task.

Table 3 presents the paired samples t-test results for the diagnostic group. The mean difference between the pre-test and post-test scores was -0.33 (SD = 0.29), with a 95% confidence interval ranging from -0.46 to -0.19. The t-test results indicate a statistically significant improvement in listening proficiency, $t(19) = -4.95$, $p < 0.001$.

To further assess the magnitude of this effect, we calculated Cohen's d, which was 1.11, indicating a large effect size. This suggests that the diagnostic technique had a substantial impact on students' listening proficiency. The significant difference

TABLE 1 Homogeneity of control and experimental groups in pre-test.

	N	Minimum	Maximum	Mean	Std. error mean	Std. Deviation
Diagnostic pre-test	20	4.50	6.00	5.275	0.0848	0.37958
Jigsaw pre-test	20	4.50	6.00	5.250	0.0850	0.38044
Valid N (listwise)	20					

TABLE 2 Paired samples test results for the jigsaw group.

		Paired differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. error mean	95% confidence interval of the difference				
					Lower	Upper			
Pair 1	jigsaw pre-test jigsaw post-test	−0.68	0.29	0.06564	−0.81	−0.54	−10.28	19	0.000

TABLE 3 Paired samples test results for diagnostic group.

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. error mean	95% confidence interval of the difference				
					Lower	Upper			
Pair 1	Diagnostic pre – diagnostic post	−0.33	0.29	0.061	−0.46	−0.19	−4.95	19	0.000

(p = 0.000) confirms that participants in the diagnostic group demonstrated improved performance in the post-test listening task.

Based on the comparison of the two groups, the results revealed that the t-observed values are higher than the critical value in two pairs (pre-test vs. post-test), indicating that the difference between the performance of the participants in the pre-test and the post-test was statistically significant. This suggests that the participants in both groups benefited from the listening techniques provided, yet the jigsaw group superseded the diagnostic group. The results represented above indicate that both groups were homogeneous, and most of the learners' listening bands were 5 and 5.5, yet after the treatment on the post-test in both groups, there was a big change in frequencies and level of the learners. The majority of the learners (50%) in the control group received 5.5. Moreover, the majority of learners (80%) in the Jigsaw group received 6. The solidarity of the progress in the jigsaw group was highly significant. This could be due to the nature of cooperative learning that learners contributed to each other's achievement.

5 Discussions and conclusion

The results of this study demonstrated that both the jigsaw group and the diagnostic group significantly improved their listening proficiency on the post-tests. The statistical analyses confirmed that the gains in performance were substantial, indicating that both instructional techniques had a positive impact on learners' listening development. However, the findings also revealed that the jigsaw technique was more effective than the diagnostic exercises in enhancing listening proficiency. This aligns with prior research (Abbasian and Ghenabi, 2016; Arnold, 1999; Rost, 1991; Sahin, 2010; Tewksbury, 2008; Yasin, 2009), which highlights the role of interactive learning in language acquisition.

As Rost (1991) emphasized, listening is not an isolated skill, and Zare-Behtash et al. (2017) further argued that meaning is best clarified through integrated speaking-listening tasks. The findings of

the present study support this perspective, as the jigsaw technique promoted meaningful interactions that facilitated integrated skill development. Learners engaged in collaborative problem-solving and discussion, reinforcing their comprehension through peer communication. This result is consistent with Şahin's (2011) conclusion that jigsaw teaching fosters active learner participation, cooperative learning, and deeper engagement in the learning process. Moreover, Sahin (2010) noted that jigsaw learners take responsibility for their understanding, contribute to their peers' learning, and engage in effective group interactions, all of which improve academic achievement. Similarly, highlighted that high levels of social interaction in jigsaw classrooms enhance students' perception of the learning process and promote better outcomes. While this study focused on Iranian advanced EFL learners, the findings may have broader applications. For younger learners or those at lower proficiency levels, the jigsaw technique could be adapted to include simpler tasks, shorter listening segments, and more structured peer support to scaffold their learning. In contrast, higher-proficiency learners might benefit from more complex discussions and extended listening tasks that challenge their comprehension and analytical skills.

The saliency of the efficacy of jigsaw listening techniques over diagnostic listening found in this study is in accordance with Yasin (2009) and Abbasian and Ghenabi (2016). The learners in this study who participated in the jigsaw classroom outperformed other learners. One revelation of this study was that the learners developed their listening skills cooperatively on the same path that at the end of the course, their level of homogeneity was much higher than from the beginning of the course.

It was concluded from the findings discussed that providing jigsaw techniques to teach listening in EFL classes will make the classes more effective in various ways.

- Enhances the level of listening proficiency of the learners.
- Enhances the cooperation and collaboration among learners.
- Changes the listening exercises from passive, monotonous, and boring tasks to active, diverse, and lively tasks.
- Moreover, in the long term, it contributes significantly to the development of EFL learners' full proficiency.

Unlike traditional jigsaw techniques that primarily rely on text-based materials, our study incorporates multimedia elements (audio recordings). This approach aims to create a more engaging and immersive learning experience, which we believe can lead to greater improvements in listening skills. Our study specifically targets EFL learners from Iran, providing insights into the applicability and effectiveness of jigsaw techniques in this context. While previous research has often focused on diverse learner groups, our study offers a unique perspective on how these techniques can be adapted and optimized for specific cultural and educational contexts.

The jigsaw techniques developed and introduced through this study provided the learners with a great deal of opportunities to speak more frequently and fluently in the classes. They could also situationalize the topics they discussed in their listening tasks in the following sessions they participated in class. This was confirmatory to Tam's (1997) findings that it is necessary to give students a variety of situations and frequent speaking tasks, which play a significant role in the improvement of students' fluency while speaking. The results show the significance of ongoing investigation and assessment of jigsaw teaching methods within educational settings. This research aims to gain deeper insights into how these techniques affect both student learning outcomes and social interactions. Educators may choose to incorporate the jigsaw method into their classrooms as a tactic for fostering cooperative learning, mitigating intergroup tensions, and boosting student engagement. The jigsaw method, a cooperative learning strategy, has been shown to yield favorable impacts on both academic performance and psychosocial outcomes among students. As educators strive to enhance student learning experiences, the jigsaw method emerges as a valuable pedagogical tool that warrants consideration for implementation in classrooms. Educators and educational practitioners can leverage the findings from this comprehensive review to craft impactful collaborative learning experiences and establish inclusive classroom environments that foster student achievement. Policymakers within the education sector should contemplate advocating for the adoption of cooperative learning techniques, such as the jigsaw approach, as integral components of comprehensive initiatives aimed at bolstering student achievement and fostering social–emotional growth. The study emphasizes the significance of evidence-based practices in education and highlights the necessity for policies that facilitate the adoption of research-supported teaching methods within schools. Further research is needed to investigate the efficacy of every single jigsaw technique provided. Language teaching today needs more practice than theory in particular. To ensure the successful implementation of cooperative (jigsaw) interventions, it is crucial to expose teachers to cooperative values, cooperative learning methods, and mastery goals. Equipping educators with the necessary knowledge and skills in cooperative pedagogy fosters a collaborative classroom environment and enhances student learning outcomes. Ongoing research should explore the effects of cognitive load on learners. This investigation should not only consider perceived load but also account for any actual system load. For instance, researchers could measure both individual and collective working memory capacities among students (as discussed by Vives et al., 2024).

The findings of this study highlight the effectiveness of the jigsaw technique in enhancing EFL learners' listening proficiency, surpassing diagnostic exercises. The study underscores the value of cooperative learning, promoting active engagement, peer interaction, and improved comprehension. Educators should consider integrating jigsaw methods to create dynamic, student-centered classrooms. Future research should explore cultural influences, cognitive load, and long-term effects to optimize cooperative learning strategies in diverse EFL contexts.

Cultural background may also play a significant role in the effectiveness of cooperative learning strategies. In collectivist cultures (Banaruee et al., 2023b), where group collaboration is already emphasized in education, the jigsaw technique may be particularly effective due to students' familiarity with teamwork-based learning. However, in more individualistic cultures, learners may require additional training and encouragement to fully engage in cooperative activities (Banaruee et al., 2023b). Future studies could explore how cultural norms influence the effectiveness of jigsaw techniques in EFL classrooms worldwide. The findings of this study provide strong evidence for the effectiveness of jigsaw techniques in improving EFL learners' listening proficiency. The results suggest that incorporating cooperative, interactive listening tasks can enhance students' comprehension skills more effectively than diagnostic exercises. However, educators should consider age, proficiency level, and cultural background when implementing jigsaw techniques in different EFL contexts. Additionally, future research should address the limitations identified in this study to provide a more comprehensive understanding of the long-term impact of cooperative learning strategies on language acquisition.

Despite the promising findings, this study has several limitations that should be acknowledged. First, the sample consisted exclusively of male learners, which limits the generalizability of the results to mixed-gender or female-only groups. Future research should examine whether gender differences influence the effectiveness of the jigsaw and diagnostic techniques. Second, the study employed convenience sampling, meaning that the participants were selected based on availability rather than through random selection. This may introduce bias and limit the extent to which the findings can be generalized to the broader EFL population. Third, the intervention period was relatively short, which may not have been sufficient for long-term improvements in listening proficiency to fully emerge. Future studies with longitudinal designs could assess whether the benefits of jigsaw techniques persist over time.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The questionnaire and methodology for this study was approved by the Human Research Ethics committee of Bartar Language Academy (Ethics approval number:

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