AUGMENTED REALITY FOR LISTENING COMPREHENSION:

AN INNOVATIVE STRATEGY FOR ARTICULATING VISUAL AND AUDITORY PROCESSES

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CIENCIAS DE LA EDUCACIÓN, LICENCIATURA EN LENGUAS MODERNAS

CON ÉNFASIS EN INGLÉS

UNIVERSIDAD LA GRAN COLOMBIA

BOGOTÁ D.C

2021

Augmented reality for listening comprehension: An innovative strategy for articulating visual and auditory processes

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Trabajo de Grado presentado como requisito para optar al título de licenciado en lenguas modernas con énfasis en inglés

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Universidad La Gran Colombia

Bogotá D.C

2021

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Resumen

La comprensión auditiva ha sido visto como una de las habilidades mas difíciles de desarrollar al momento de aprender inglés como lengua extranjera debido a las dificultades que se basan en el desconocimiento de palabras y acentos, falta de vocabulario, así como no identificar detalles o información específica. Razón por la cual la tecnología fue usada como herramienta para el desarrollo de materiales con Realidad Aumentada para la escucha, articulando esto con audios para lograr una relación audio visual. La escucha se midió con unidades didácticas donde el estudiante debe reforzar su comprensión auditiva teniendo en cuenta las micro-habilidades o sub-habilidades en la escucha, y de esa manera, ellos deben identificar la información fácilmente. Los participantes fueron estudiantes de nivel intermedio de inglés de la Universidad La Gran Colombia, ellos fueron escogidos aleatoriamente para trabajar en un grupo experimental y un grupo control. A los estudiantes se les requirió trabajar con unidades didácticas donde algunos marcadores fueron usados no solo para escuchar el audio sino también para ver y tener un estimulo audio visual y así tener un contacto diferente con la información que ellos están escuchando. Nuestra hipótesis es que la Realidad Aumentada se puede usar para incentivar la relación audio visual con el propósito de mejorar la comprensión auditiva de textos en lenguas extranjeras.

Palabras clave: Comprensión auditiva, sub-habilidades auditivas, Realidad aumentada, Material audiovisual, ELT.

Abstract

Listening has been seen as one of the most difficult skills to develop at the time of learning English as a foreign language due to the difficulties which rely on the misunderstanding of words and accent, lack of vocabulary, as well as not catching details or specific information. That is why technology was used as a tool for developing augmented reality materials for listening, articulating it with audios for achieving an audio-visual relation. Listening was measured by didactic units where the students should reinforce their auditory comprehension taking into account the micro-skills or sub-skills in listening. The participants were students from an intermediate level of English at Universidad La Gran Colombia; Participants were randomly chosen to work in an experimental group and in a control group. Students were asked to work with didactic units where some markers were used not only for listening to the audio but for watching and having a visual input to have different contact with the information they were listening to. It is expected that Augmented Reality might be used to stimulate the audio-visual relation in order to identify the effects that this could have on the listening comprehension development of the students.

Keywords: Listening comprehension, Auditory sub-skills, Augmented reality, Audio visual materials, ELT.

Statement of the problem

Listening is one of the relevant receptive skills in languages which has a strong relationship with the production of words. On account of this, Rost (2011), states that listening is a crucial skill for the language as well as speaking because without auditory comprehension it is impossible to reach the communicative ability, so it means that the importance and development of this skill is essential at the time of speaking any language. Despite of this, Goh, (2000) and Vandergrift, (1999) argue that listening competence, represents more difficulties during the English learning process for the English Foreign Language (EFL) to the students because of different facts like, lack of comprehension, no retention of information, the misunderstanding of words, and not enough vocabulary, discriminating between sounds, grammatical structure, intonation, stress and context (as quoted in Chen & Chen, 2019).

Despite students' struggles, language teachers still implementing learning materials such as digital devices, video blogs, educational platforms and text books (Cruz & Velazco, 2016). Therefore, according to Oviedo, the most frequent materials that Colombian English teachers use in the classroom are the course books (as quoted in Macias, 2010). However, Kelly (2015), states technology as hardware, software and the use of the Internet are one of the most powerful tools that exist for education. Besides, in Colombia we have a lack of teachers' training, time, experience, beliefs and vision about technology, that are an obstacle for implementing new strategies in the classroom that could be more effective for the learning process.

According to the B.A in modern languages with emphasis in English Syllabus (2019), at Universidad la Gran Colombia, proposed for Intermediate Level students (B1+), learners will develop the ability to understand familiar situations that are related to work, school, leisure time

and also, they might be able to manage situations about travelling where they have to use the language.

Based on the Common European Framework of Reference (CEFR) (2001), the Intermediate students might connect ideas in a text in which they can be interested or not, and additionally, they will express wishes, future events and give explanations or opinions about social media, work skills, climate and extreme weather, art, and crimes. For the listening skill, at this level, the students prepare themselves for understanding the main idea of the radio or TV programs and topics that talk about personal or professional interests.

The Need Analysis implemented for this study and the Preliminary English Test (PET) that Intermediate students took, showed that they present difficulties with listening comprehension and with auditory sub-skills or micro-skills, such as identifying specific information, listening for keywords, and listening for prediction, due to the misunderstanding or lack of vocabulary knowledge, missing of adaptation of the accent and conversations in real contexts, among others (see Annex 1-2).

Given the difficulties just stated, our research question is: What are the effects of Augmented Reality as a new technology in the classroom to improve listening comprehension sub-skills such as identifying key words, predicting and identifying specific information among the students of Modern languages with emphasis in English in Intermediate Level at Universidad La Gran Colombia?

Research objectives

Goal

To find out the effects of applying innovative teaching materials using augmented reality for improving listening comprehension among students of Modern languages in Intermediate level at Universidad la Grancolombia.

Objectives

- To identify the weaknesses of Intermediate level students in listening comprehension sub-skills by providing a Preliminary English Test and implementing a Needs Analysis.
- To apply the listening comprehension theory in teaching materials design based on augmented reality.
- To evaluate the impact of the augmented reality materials that were used, in the development of listening comprehension by comparing the Pre and post-test.

Chapter I. Rationale

According to Kai (2016), the English language is one of the most powerful languages in the world because of the relation that it has with geography, economy, communication, knowledge, media, and diplomacy which are the categories most influenced by it. Also, it is spoken in many countries; that is why in Colombia it is important as well. English teachers in Colombia work with strategies in order to facilitate the students' learning process to provide them the tools for having a good performance of the language, considering that language is a process that requires constant practice for imposing it in real life. Augmented reality technology articulated with audio-visual materials can be useful for this process as it will not just give them experiences in real life about listening, but also it will be an important tool for all teachers in order to give possible solutions to the most common difficulties, specifically on identifying specific information in the audios, also key words and prediction, as we noticed in the results of the need analysis and the PET applied for the purpose of this research. Augmented reality offers innovative tools and a teaching strategy to be used in language classrooms for reinforcing listening comprehension skills.

EFL learners usually do not know how to practice the English language skills, it could be in view of the fact that most of the time they just study for the exams, and due to the lack of motivation, they focused just on having good scores instead of having a good learning process in what they are studying (Sanchez, 2014). Students try to memorize and repeat what they have learned, but usually, they do not comprehend or understand the use of the abilities or the sub-skills of the language to become a foreing language speaker attributable to the fact that they are not aware of their learning process.

Commonly, listening is the skill that represents most obstacles for the students because they have different difficulties like lack of comprehension, no retention of information, the misunderstanding of words, and not enough vocabulary (Goh, 2000). Listening comprehension is a difficult ability for the EFL learners because it is a passive activity that requires discriminating between sounds, understanding vocabulary, known grammatical structures, intonation, and stress (Vandergrift, 1999). Also, listening is a skill that requires deep practice because students should know how to listen and comprehend what they are listening to.

At Universidad La Grancolombia, one of the majors is Modern Languages with Emphasis in English where the students take 10 hours per week of English instruction for five semesters. That is why, students can take advantage of having a better performance of the language. That means Intermediate students according to the CEFR (2001) should be classified in B1+ level which means that they understand complex conversations, comprehend speeches and lectures, understand news, programs and films with different types of arguments.

Nevertheless, pointing out the strategies for learning how to listen to audios or a regular conversation or another kind of listening activity, the students do not have a good comprehension of the language, and it is laborious for the ear to get adapted to another language different from the L1. In this case, the audio-visual materials are useful for listening comprehension since people are listening and watching something at the same time in order to understand a topic, the experiences are richer and the retention of the knowledge is greater.

Audio-visual materials could be implemented for the comprehension of listening in the pupils, not only for practicing but also for learning how to use them. In fact, Augmented Reality is a technological and innovative tool that creates real experiences with virtual objects with the

aim of giving people a different insight into the real world (Billinghurst & Duenser, 2012). That means working with Augmented Reality and listening input development could signify an enhancement in the acquisition of the language in the Intermediate level students.

The purpose of this document is to figure out the effects of the implementation of augmented reality for gaining the key words, specific information and prediction sub-skills of the listening processes in order that EFL learners comprehend and infer the speaker's purpose. In this way, intermediate students at Universidad La Gran Colombia will have a better understanding and performance of the listening comprehension by implementing this kind of strategy with Learning materials. Consequently, the experiences will be significant not only for practicing the listening but also to get comfortable and have a better L2 performance.

According to what was mentioned above, listening comprehension is a fundamental skill for acquiring a new language, but also it is difficult for the EFL learners because of different aspects related with the comprehension. The audio-visual input is an effective strategy for learning, taking into consideration the use of senses and experiences that Augmented Reality gives, working with real objects for articulating the real with the virtual world.

Literature Review

Within this part we review three topics that are crucial for the development of this research. You will find at the beginning, the Augmented Reality applied in Education, where we mention three previous works. The first one, by the Education and Information Technology Journal, the second one research was applied by Computers and Education Journal and the last one by Virginia Tech University. Then in the second topic you will find Audio-visual materials, so in the first place a research from African Educational Research Journal and the second one the

Turkish Online Journal of Educational Technology and finally, the two works focused on listening which are from the international Journal of Listening and Procedia-Social and Behavioural Science.

One of the most relevant studies for this research is the work written by Demitriadou, Stavroulia and Lanitis in 2019 that was called *Comparative Evaluation of Virtual and Augmented Reality for Teaching Mathematics in Primary Education* where the students had difficulties to understand the differences between figures and shapes, so three different groups were selected, the first group used traditional materials such as worksheets (control group), the second group implemented virtual reality and, the third one used Augmented Reality. The results showed that groups which worked with virtual and Augmented Reality had a deep understanding in comparison with the control group, also the students' interest increased with technology use because they had the chance to manipulate the virtual elements.

Another important research article was written by Danaei, Jamal, Mansourian and Rastegarpour in 2020 that was called *Comparing Reading Comprehension Between Children Reading Augmented Reality and Print Story Books*, on account of the stuggles that students had at the time of recognizing words and read texts; the researchers used electronical books with Augmented Reality for comparing the traditional version of the book with the augmented one. The purpose of this research, was that students gained the retelling and recalling process meanwhile they were reading a book ; the experience of manipulating virtual images, listening songs and touching the real object, showed at the end of the research a higher score in the AR group and also the improvement in recalling, retelling and comprehension of the students after reading.

According to Antonioli, Blake and Spark (2014) the AR educational programs are focused on students' interests because they are able to explore the world in an interactive way. Also, AR is flexible, which means that when we use it in education, it is attractive not only for the students but also for teachers. One of the main reasons to use Augmented Reality is that it could be used in the classroom and also it gives the opportunity for practicing outside the classroom. That is why this innovative tool is linked to the different experiences that people might have in their day-by-day activities and as it is flexible it can be adapted to many topics inside the classroom for having the student as the center of the class.

Regarding the use of audio-visual materials, it was written an article called *Impact of Audiovisual Materials in the Dissemination of Knowledge for Facilitators in Some Selected Literacy C0enters in Oshodi/ Isolo Local Government Area* by Anyila in 2016, where it was stated how the audio visual materials can facilitate the knowledge in some literacy centers, additionally, it was studied the different dispositions of the audio visual materials, how often were used, the obstacles or boundaries that could happen in the process, and finally, the vision of the facilitators who faced with audio visual materials and consequently the results that showed the inadequacy of the centers at the time to work with these materials, the lack of training and knowledge of teachers and in this way, the unfamiliarity of people about the materials.

Additionally, Çakir (2006) states that audiovisual materials for learning as foreing language are a good strategy that facilitate the learning process.

According to Wright (1976)

> Media and many styles of visual presentation are useful to the language learner That is to say, all audio-visual materials have positive contributions to language learning as long as they are used at the right time, in the right place. as quoted in Çakir, (2006, p. 67).

Taking into account what was mentioned, we can find a strong relationship among those two senses, and in that way, it is recognizable that if those materials are used in the teaching field, they can be helpful for the students at the time of learning something in relation with their own reality or experiences.

On the other hand, one important research about the listening learning process is *The Impact of Pre-Listening Activity on EFL Learners' Listening Comprehension* by Madani, and Kheirzadeh in 2018; where the researchers split a group of students in four groups to implement different strategies for gaining listening comprehension. The main listening activity was based on the Test of English as a Foreing Language (TOEFL) and International English Language Testisng System (EILTS) exams and the students were in elementary and advanced level, so in each group they implemented a different pre-listening activity (reading questions, discussing the listening content, teaching vocabulary and discussing the listening topic), each group presented a pre-test before the activity, then make the pre-listening activity, consequently, the audio was listened and finally they present a post-test in order to check the comprehension. The results showed that all the groups have a better comprehension of listening later in the activities.

Another listening study is *The Effect of Using English Captions on Iranian EFL Students' Listening Comprehension* by Ghasembolanda, and Nafissi in 2012. The researchers use one experimental group and one control group for working in the listening comprehension of the students with captions and no captions. The participants watched 20 minutes of a film, the

experimental group watched the film with English captions, and the control group without captions. Students presented a pre-test and a post-test to show and verify the comprehension of each group, finally, the results showed that the experimental group answered the questions better than the control group, concluding that providing captions is helpful for improving EFL learners' listening comprehension.

Chapter II. Conceptual Framework

Listening

Listening is one of the most sophisticated behaviors in the universe, it is also defined as an invisible process that should be described with descriptions, analogies, and metaphors. Listening has some orientations; they are receptive, constructive, collaborative, and transformative (Rost, 2011) “Listening is a passive activity. It is a complex, active process in which the listener must discriminate between sounds, understand vocabulary and grammatical structures” (Vandergrift,1999 p.168).

Augmented Reality in Education

It is a technology where virtual objects are brought to reality to work with the senses of hearing, touching, and smelling in order to stimulated them and create real situations, so that means it provides different experiences articulating the virtual and real contexts for giving the opportunity to create a relation with multimedia content (Billinghurst, 2002).

As Leung and blauw, (2020) mentioned, “Ar is defined as a 3D technology that promotes an individual perception and understanding of the real-world surrounding by overlaying virtual objects onto the real world” (as quoted in Danaei et al.,2020, p.2)

Audio-Visual Materials

Audio-visual materials in the teaching and learning processes can not go deep, some of the importance related to these materials are: “extending experience, encouraging participation, estimulating interest, individualizing instruction, serving as a source of information as well as making learning permanent” (Ayinla,2016, p.20)

It is an entrance of the natural language where it is involved hearing and visual senses, that represents events and actions symbolically, audiovisual speech generates greater activation in the auditory cortices of the brain because both senses are being stimulated at the same time. (MacSweeney et al., 2002).

Theoretical Framework

This theoretical framework presents the theories underlying the main issues addressed in this study. In the first place, you will find the theory about listening, this part is based on Vandergrift and Goh (2012) and Schmitt (2010) books, besides there is the explanation and description about the sub-skills or micro-skills according to different authors and their taxonomies; and the last part of listening concerns in the listening comprehension teaching activities that will be useful for understanding the process of this research. The second topic is learning materials and the EFL materials that we could find and then the theory with respect to authentic materials and its development. And finally we present a short overview about Augmented Reality and listening comprehension and their relation.

Listening

Listening

Listening is a receptive skill based on an active process that involves other skills such as speaking, and for its development it is important the recognition of the context (Schmitt, 2010), sounds and visual inputs which require the activation of the prior knowledge that Vandergrift and Goh (2012) explain as the conceptual knowledge and life experiences that learners have acquired. This skill is one of the most important to develop for language learners sice we

consider it is one of the principal ways of communication in order to hear, comprehend and respond to a message.

The listening process goes hand by hand with the recognition of sounds, "perception of intonation patterns" and "interpretation of what is being said" (Schmit, 2010, p180), that is why according to Scott (2008), DeVito(1993), Farley(1988), Hanna (1995) listeners learners find listening as a complex skill, bearing on mind that is a circular process (as quoted in Al-Omari, A & Al- Mahasneh, R 2011); this process begins when the listener receives the message, then understands the content of what is being said, continues with remembering what was said later, evaluates the message and finally, the listener will be able to respond, (Schmitt, 2010). For this research, it is important to fully know this process as a consequence of the facilitation of the comprehension process, regarding the cognitive processes for listening development which creates a deeper understanding of what is being heard.

To be competent listeners, students should know the three main aspects of the listening process, which lay in cognitive, knowledge sources, and unique features of interactive listening (Goh, & Vandergrift., 2012). The cognitive part describes what listeners do during the listening, and it is composed by the bottom-up process in which the units of sounds are divided for interpreting the whole message, in other words, when the listener starts to take word by word and join them, creating a whole sentence meaning depending on the word sounds and, in that way, having a clear idea of what is listened to.

As Harmer (2007) exemplifies:

> The "sentence depends, for its success, on putting a number of elements in the correct order, in this case subject (it), verb (is), complement ('warm' - called a complement

> because it adds information about the subject), and adverbial (‘in here’ - called adverbial because it further exemplifies the verb). The elements have to go in the right order for the sentence to work. If we tried to say ‘*It here in warm is’, the sentence would not work. In the same way, we have to be careful about the types of words we can put in the slots (subject, verb, etc). We can’t, for example, put an adjective or an adverb in the subject slot (‘^stealthily is warm in here/inhospitable is warm in here’), or a verb in the adverbial position (‘*It’s warm go’). (p. 60).

The listening comprehension is also composed by the top- down process, that is the application of context and prior knowledge for making a sketch of the text for understanding better what is listened to, that means, the listener use the experience as a reference on what he/she is listening for having a clear context with the aim of getting a general representation of the message, and also this process is reinforced by inferencing or making hypothesis of the message because not all is being comprehend.(Schmitt, 2010).

As Harmer (2007) exemplifies:

> Suppose, for example, that the words are spoken by someone who is either lazy, ill or in some position of power. ‘It’s warm in here’ might then be either a request or an order for someone to open a window. If, however, two people come in out of the cold, ‘It’s warm in here’ might well be an expression of satisfaction or pleasure. If, to give a third example, two people are trying to decide which room to use as their bedroom, the sentence ‘It’s warm in here’ might serve as a suggestion to choose or not to choose the room. In each case, the sentence is performing a different language function (see page 76), e.g. requesting, suggesting, etc. (p.59).

Therefore, according to Johnson (1996), there is conscious attention of elements in the listening process that becomes automatic at some point with the practice (as quoted in Goh & Vandergriff, 2012); afterward, we have a perception, parsing, and utilization that are the three concepts which provide a better perspective of how listeners construct meaning, and finally, the concept of metacognition as the cognitive processes which constitute "planning, monitoring, problem-solving and evaluating to effectively regulate listening comprehension" (Goh, & Vandergrift, 2012, p. 23).

That is why the teaching materials used for this study were based on those cognitive processes since the listening activities were adapted to develop the skills related to those that were mentioned above. Also, the idea of these materials was to create a constant practice, in which the students could be more aware of the processes that they were going through at the moment of listening, so they can improve their abilities and try to identify easier the sounds, the context and vocabulary, and in such manner, interpret complete messages.

The importance of developing good listening skills is having a good listening comprehension, which entails the previous knowledge that students already have, the vocabulary they know, the recognition of the sounds of the words, the identification of context, among others. Once those things are achieved, at the time of having a conversation, they are able to answer questions or just respond to specific messages. In short, listening comprehension is an active process where listeners analyze and interpret what they hear based on their linguistic knowledge and the prior knowledge or experiences they have had.

We based our research on the listening comprehension model created by Vandergrift and Goh (2012); this model at the same time uses the cognitive framework proposed by Anderson

(1995) and the construct of metacognition that further is a mirror of the speech production model developed by Levelt (1989, 1993, 1995).

Figure 1

Cognitive Process and Knowledge Sources in Listening Comprehension

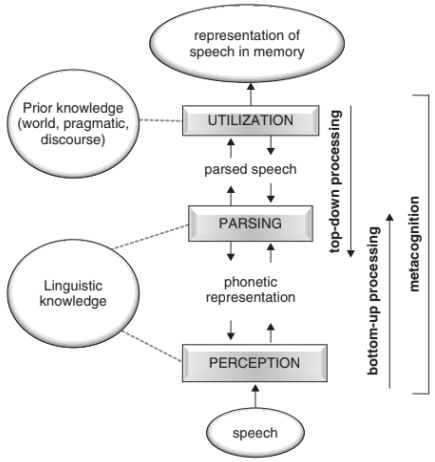

Figure 2.2. Cognitive Processes and Knowledge Sources in Listening Comprehension

Taken from "*Teaching and Learning Second Language Listening"*, by C, Goh, & L, Vandergrift,2012.(http://peterstrutt.co.uk/wp-content/uploads/2019/07/Second-Language-Listening.pdf)

This model entails the perception which refers to the recognition of sound signals, by the acoustic-phonetic processor that creates a relation with the working-memory using the bottom-up process that will rely on their L1 on account of the sounds they are able to recognize at the time of listening; then the parsing phase is the mental representation made by the listener using "bottom-up processing, that informed by top-down processing from the conceptualizer the parser, attends to segment the sounds stream into meaningful units, through phonological analysis and word retrieval from the listener mental lexicon" (Goh, & Vandergrift, 2012, p.42)

furthermore, in the utilization phase, the students make a mental representation of what was being retained, linking it with the knowledge of the long-term memory; as Anderson (1995) mentioned, it means the listener is getting ready to give a response (as quoted in Goh, & Vandergrift, 2012).

Finally, metacognition is "our ability to think about our own thinking or "cognition""(Goh, & Vandergrift, 2012 pp.83-84) a certain conscious process composed by planning, monitoring, problem-solving and evaluation, as well as, Kluwe (1982) mentioned, metacognition is seen as a strategy for being more conscious of what it is being learned and it is possible that individuals can construct an understanding of themselves and their world, controlling their thoughts, behaviour and monitoring the consequences as it was explained (as quoted in Hacker et al; 2009).

Sub-skills

The sub-skills or also called micro-skills ar**e** "specific behaviours that language users do in order to be effective in each of the skills" (British Council, 2018, parr.1). Therefore, Field (1998) said that sub-skills are competencies that learners should acquire when they are learning the language in order to achieve the same level of native people (as quoted in Sekścińska, & Olszańska, 2018). The main purpose of using the sub-skills in this research is that the listener can be able to identify different aspects, owing to articulate them and understand better what was listened to. It is necessary to clarify that there are a lot of listening sub-skills, but this research is focused on some of them: 1) listening for predicting, 2) listening for key words, and 3) listening for key information. These sub-skills were chosen due to the results of the Need Analysis that was applied, as explained in chapter 1.

I.Listening for Key Words

This sub-skill is important not only for relying on the learner's knowledge but also because the pronunciation of the speaker has a stronger influence so that learners understand the words and grasp the context.

That is why top-down and button-up processes are important for the reason that students should understand the context and then pay attention to the specific details that are given, that means comprehending the meaning of the words and the conversation for getting the purpose of the message. The bottom-up process is remarkable as it is the way in which we find the form and meaning of the words due to one word that can have different meanings but just one form (it is the same word) depending on the context. For example, "'can' (= ability, permission, probability - and a container made of metal)." (Harmer, 2007, p.63), here in this example we can see that the word *"can"* has a different meaning but the root does not change. Also, the top down process is a fundamental complement here because of the work that prior knowledge has when recognizing the word in its proper meaning for achieving the whole meaning of a phrase.

On the other hand, Cargile, (2002), Cargile and Giles, (1998), Kalin, Rayko and Love, (1980), and Singer and Eder, (1989) argue that the accent of the speaker is important for the listener because the words will be identified according to the language characteristics such as phonological and grammatical contrasts (as quoted in Carlson & McHenry, 2006). Also, Cargile, (2002), Giles and Powesland, (1975), Ryan, (1979) Hewstone and Giles, (1984) , Kalin and Rayko, (1978) refer to these characteristics as those related to the aptitud, intelligence and socioeconomic status (as quoted in Carlson, & McHenry, 2006). Consequently, Nicolisi, Harryman ans Kresheck, (1996), Bresnahan, Ohashi, Nebashi, Liu ans Shearman, (2002),

Derwing and Munro, (1997), and Munro and Derwing, (1999) states that the fundamental characteristics that should be taken into account when we are talking about accents are the intelligibility that is the attitude and affective response and comprehensibility that is based on native accent and what the listeners comprehend regarding the message (as quoted in Carlson, & McHenry, 2006).

Therefore, we can say that key words are related to the recognition of sounds, words, accents, meaning and sentences which can be changed according to the content given and that is why it is a help for making sense of what we listen to.

II.Listening for Prediction

Listening for prediction is the sub-skill according to Vandergrift (2003), in which students are able to anticipate information taking into consideration images, vocabulary and other resources in order to conceive an idea about what they will listen to for getting involved in a specific context (as quoted in Amin, et al., 2011). This sub-skill is an important component of top-down process since it is in charge of the comprehension of the message, it starts with what the listener think that will listen to in the audio and the application of the knowledge that they will need when listening to the message (Goh & Vandergrift, 2012), thereby it is mentioned by Anderson and Lynch (1988) students can make hypotheses according to the speaker's message for achieving a deep comprehension, adapting it to a proper context (as quoted in Schmitt, 2010).

Listening for prediction sub-skill can be articulated with pre- listening activities where the students will be prepared for achieving a listening prediction by checking new vocabulary in order that the students can interpret the information they are up to listen.

Thus, the strategies that can be used at the time of prediction can be linked to figuring out the meaning of some words that are within the listening, as well as asking some questions that could be related to the main topic for activating the prior knowledge in a top-down process.

III. Listening for Specific Information

It is a process that requires concentration and vocabulary management that will be used to make emphasis on the important points of the text, so, bearing in mind that in this sub-skill the listener applies the top-down process, in view of activating the previous knowledge and the importance of the context. As such, at the time of listening, the students are able to recognize some information in an easy way and they will not be out of context when listening.

As well as it should find out pieces of information like words and phrases important in the text and noticing that this information should be related to what they need to listen to (Syllabus 2010, p. 22).

As Byrne, (1986) said, the message is presented with a detailed form in which some of that information is more needed for the listener for getting an idea and the context of the message, consequently, the listener should focus in specific points about what he/she needs to know because he/she can not get all the information of the listening at the same time (as quoted in Al-musalli, 2001).

Listening comprehension teaching activities

After selecting these sub- skills, it is important to know the stages that the teacher and the students should follow for achieving better listening comprehension practice. For this study we divided the listening practice class into three steps:

I. Pre-listening

According to Goh & Vandergrift (2012), pre-listening is the previous listening contextualization, where the students have some aspects for recognizing what they will listen to, and provide them an overview of what will be done in the stage of "during listening". "Pre-listening activities serve the goal of ensuring the students know what they need to know before they listen" (Solak, 2016, p. 37). Therefore this author considers that the idea of these activities is to activate the previous knowledge of pupils for helping them to predict what they will hear. This is implemented in this research with the purpose of being clear in what they are up to do when listening**,** additionally, some information given will allow them to have an idea of what they will listen to.

I. While-listening

While-listening activities are related to the students performing during the listening process, or immediately after the listening. Underwood (1989) "explains the goal of while-listening tasks as being something that helps the learners understand the messages of the listening text." (as quoted in Solak, 2016, p.38). These activities are also known as those that students develop while they are listening to audios, for completing what was required, and work in the comprehension process following the listening theory steps to have better comprehension. According to Abdulrahman (2018), in this step the students are able to create a complete meaning about the message, and also settle down if the previous information taken was correct or not, which it is essential during the listening process, since in this stage all the components and previous knowledge play an important role for the recognition and analysis of what is being listened.

III.Post- listening

Wilson (2008) argues that "In the post-listening stage, students work in detail applying both top-down and bottom-up strategies to link up the classroom activities and their real lives."(as quoted in Solak, 2016, p. 39). These kinds of activities require more time than pre and while-listening activities because students should deal with thinking, discussing, reflecting and writing processes. (Solak, 2016). On account of this, the step is also necessary for creating a complete comprehension regarding the listening, based on the analysis, discussions, clarifications, and conclusions that can be made after listening to a message with specific information, in fact, Goh and Vandergrift (2012) argue that after having a comprehension of a message, it is possible to check what was understood or misunderstood, finding out the context and considering the pragmatical part. In this research, according to what was said earlier, the purpose of the post-listening was that students relate all the previous work and articulated it with their own outlooks.

Learning materials

Teaching or learning materials according to Richards (2001a),

> Are a key component in most language programs. Whether the teacher uses a textbook, institutionally-prepared materials, or his or her own materials, institutional materials generally serve as the bases for much of the language input learners receive and the language practice that occurs in the classroom (as quoted in McGrath, 2003, p.9).

Thus, in this research we implemented some materials as tools for facilitating the learning process regarding the needs of the students in their listening process.

As Lahdes (1997) mentioned, Teaching materials are not only books and worksheets but also internet pages and real-life items, it must be considered that materials are also a source of information that articulates with the subject that the student is learning (as quoted in Bovellan, 2014). According to McGrath (2008), materials include realia and representations; that was one of the reasons for implementing Augmented Reality as principal materials, so students have a closer and more realistic view of what they were listening for creating a relationship between the AR graphs (Virtual objects in 3D) with their previous experiences (as quoted in Bovellan 2014).

EFL materials

The materials used in English Language Teaching (ELT) are textbooks, worksheets, web pages, among others, and also, it is important to mention that these resources are considered as authentic materials due to their benefits for the language learning process. EFL materials are divided into two sections:

I. Authentic Materials:

The authentic materials according to Rogers (1998) are defined as those that are appropriate and that have quality regarding the goals, objectives and learner needs joining it to real life and meaningful communication (as quoted in Kilickaya 2004). Guariento and Morley (2001), said that authentic materials are significant because they increase students' motivation when they are learning, as a consequence that they are exposed to the ‘real’ language (as quoted in Kilickaya 2004).

The authentic materials were useful in this research due to the experience that students had at the time of working with Augmented Reality, because they were exposed to the real use of the language in a real-life context by the interaction among the listening and AR graphics, giving

them the opportunity to recreate spaces that provide a real experience. As well, students work with didactic units where activities were implicated for facilitating the comprehension of what they listened to.

II. Textbooks:

As Widdowson (2005) mentioned, textbooks are the EFL materials used by teachers and these books are accompanied by communication skills that provide cultural information to explain that culture already exists and it means the students will have more interest in the content, (as quoted in Reymann 2009).

Regarding the cultural information used in textbooks, we implement some cultural background whitin the didactic units in an attempt to give some information to the students that involves the English language.

III. Development of EFL materials

Within the development of teaching materials, we have that it is important call to mind the course objectives, the target language, the context and the population. The development of the EFL materials "the cognitive skills, means adapting materials in such a way as to require students to hypothesize, predict, infer, make connections and associations and visualice" (Tomlinson, 2014, p.90). In this research, some of the previous characteristics were used in the creation of the didactic units designed with specific activities that gain the population's needs and purposes.

IV. Audio-visual materials

Anzaku (2011) suggests that "the term audio-visual materials is commonly used to refer to those instructional materials that may be used to convey meaning without complete dependence upon verbal symbols or language" (as quoted in Ashaver & Mwuese, 2013, p. 44).

In addition, if the student is aware of what he is doing, he would be able to understand better on account of the information passing through his/ her senses (Ossai-Ugbah, et al., 2012). As audio-visual materials involve senses, it facilitates that the information is permanent, so the response of the student is effective when it is related to the materials they already saw.

Audio-visual materials include:

Realia that is related to real situations, so, those can be field trips, demonstrations, experiments, and different direct experiences, they can be divided into grammatic transformance that are related with puppets, Models, Mock-ups Globes, and Relief Maps which can be dioramas, television programs among others, (Ashaver & Mwuese, 2013). Therefore, we decided to work with audio-visual materials owing to the connection with the listening exercise that was implemented with some graphics considering that the purpose is that students can retain the auditory information given and associate it with the graphics they have seen.

Augmented reality and listening comprehension

Augmented Reality is defined "as a real-time direct or indirect view of a physical real-world environment that has been enhanced/*augmented* by adding virtual computer-generated information to it" (Carmigniani et al. 2010, p.342). The use of virtual and Augmented Reality gain people's interaction for getting closer to real environments by bringing virtual information in real-time (Carmigniani et al., 2010). Indeed, AR is a technology according to Azuma et al.,

(2001) “can potentially apply to all senses, augmenting smell, touch and hearing as well” (as quoted in Carmigniani et al. 2010, p.342), which means that this kind of technology “*augments* the sense of reality by superimposing virtual objects and cues upon the real world in real time” (Carmigniani et al. 2010, p342).

Furthermore, AR is based on detecting patterns of real scenes by images with cameras, thus, to register an augmented reality image the computer uses a vision that is articulated to the video detection. The process starts when the camera recognizes one physical image, after that, the image is detected by different image processing methods that are going to show some images to people through the camera making a connection between 2D (markers) and 3D images (graphics). (Furht & Carmigniani, 2011).

Taking into account what was said above, the markers are simple pieces of paper or images that can be easily recognized by the camera showing some 3D virtual objects. However, in this research digital images were implemented as markers, these images were designed by us and it was just some images with some letters in a circle that at the time of making contact with the camera it showed the 3D graphics.

The Augmented Reality has been used in education due to the real experiences that it brings to the students, taking into cosideration that this technique could be significantly for the learning process, given that AR has a strong relation with the images, it has brought new possibilities in education for learning in a different way and interaction with peers. That is why AR has been used for learning different subjects but also for learning a second language because of the connection with communicative skills.

The concept of media, according to Smaldino, et al. (2002), states “the word media comes from “medium” from the Latin language that means carrier or escort, a thing bringing information from a source to a receiver.” (as quoted in Kirana 2016, p. 235).

And from that, we have other terms such as visual media, audio media and audio-visual media. In this case we are going to talk about Audio Visual Media (AVM), where the information enters by the auditory and visual senses, so, in the teaching learning file, students can adquiere the information easily and the teacher can provide the message in a concretely way in order that students can stimulate their knowledge and their understanding**,** gaining the pupils motivation. (Kirana 2016).

That is why Buck (2001), mentioned that AVM increased the listening experience of the student in the EFL learning process, because of the relation between visual and listening inputs that could generate a better understanding of the language (as quoted in Kirana, 2016) in the meanwhile it allows the students to identify differents aspects as the context of the situation, regarding the places where the conversation is taking place, so that student can catch the whole meaning of the message (Kirana,2016).

According to Buck (2001), having visual aids can help to increase the auditory comprehension of the students that are learning a language, including those that present more issues in the language acquisition process (as quoted in Kirana 2016). Consequently, to those facts mentioned previously, we decided to implement Augmented Reality for listening comprehension using the AR as the visual input for recognizing easily some vocabulary, context and the main idea of the audio provided, because they can recreate relationships using these inputs and their own previous experiences to reinforce their comprehension in L2.

Generation Z:

It is the one that is composed by one of the youngest generations that have been involved by a digital society and also, they are exclusively people that are around 20 years or less. Thus, if we talk about millennials and Generation Z, they have similar behavior but the last ones do it a little bit differently, regarding that these people consume is higher than the others.

Besides, the Augmented Reality as a new strategy for listening comprehension was implemented as well, based on some statistics, provided by Cerezo (2017) where they established that the newer generations are more influenced by devices as computers, cell phones/smart-phones, tablets, television and video game consoles, due to the fact that people use these devices about 17 hours per day. We can not deny that technological advances motivate young people to use it in many aspects of their daily life. Thus, paying regard to the Needs Analysis that was applied, where students showed a biggest interest in studying and practicing their English with their technological devices.

Chapter III. Methodology

Post-positivism

The paradigm used for this research was post-positivism, which combines positivism and interpretivism. As Wildemuth, (1993), Fischer, (1998)., Phillips and Burbules, (2000) mentioned, it focuses on researching issues that involve experiences and announcing the results of the majority says for being acceptable (as quoted in Hamed et. al 2017). This paradigm goes through the limitations of positivism that it focuses on quantitative information and rejects the existence of individual/subjective outlooks of the facts. (Hamed et al., 2017).

Mixed methods

As Creswell and Plano Clark (2011) argues, this procedure mixes both quantitative and qualitative methods in one study for understanding better the research problem (as quoted in Creswell, 2012). It is necessary to understand each approach following that the collection of the data requires time and an extensive analysis of the results, moreover, this method consists “of merging, integrating, linking or embedding, the two “strands”"(Creswell,2012, p.535).

This research used the mixed approach owing to it was paramount to know if students had improved their listening comprehension process by comparing the results of the AR implementation for improving listening sub-skills in an experimental and a control group. Also a pre-test and post test were implemented. On the other hand, we collected qualitative information because it was necessary to know the perception of the students regarding their use and performance with the AR teaching tool.

Embedded Design

Firstly, this is one of the designs which belong to the mixed methods, "the purpose of embedded design is to collect quantitative and qualitative data simultaneously or sequentially, but to have one form of data play a supportive role to the other form of data" (Creswell 2012, p.544), either, qualitative or quantitative could be the support for the other (Creswell, 2012). Meanwhile, we collected the data simultaneously and we decided that qualitative data will support quantitative data.

Quantitative side of the Research:

Quantitative approach involves numeric information for supporting, rejecting or building evidence in favor of their theories or hypothesis because it always goes hand by hand with a precise measurement. (Leavy, 2017). Based on this approach, we used the quasi- experimental design that belongs to the quantitative research method; this design is an approach that has different elements of an experiment , with the difference that in this design the population is not randomly chosen but it was a population with similar and specific characteristics related with English as a Foreign Language learning processes.The population was divided into two groups, one as the control group and the other as the experimental group. (Bono, 2012).

Qualitative side of the Research:

We also included qualitative data in this research due to the importance of the students' beliefs and opinions about the new materials that they were using. Qualitative research studies the meaning and experiences that people have at the time of making a specific process, besides, this approach uses peoples' outlooks regarding "activities, situations, circumstances, people, and objects", in order to create a deep description and exposure of data. (Leavy, 2017, p. 124).

Having said that, this research is also qualitative because the student's opinions were taken into account for knowing how they felt using a new technological tool such as Augmented Reality for learning how to listen in a foreign language. Here the instruments were interviews with open-ended questions, which provided us information that we could not get with the quantitative data.

Variables:

The variables that were implemented in this research were the independent variable, which was the use of Augmented Reality given the variations or different results that could be provided because the experimental group worked with AR and the control group with the traditional strategy of listening. Then, the dependent variables we focused on are three: 1). Key information in listening, 2) listening for prediction and, 3) identifying specific information (sub-skills). Regarding that those were aspects in which we wanted to find out the effects that AR could have in the listening comprehension process, but also, were the aspects we checked in the group that didn't use the AR technology for comparing both groups performance.

Population:

The population chosen for this research were a group of students in Intermediate Level of English (B1+) at Universidad la Grancolombia, this group was composed by 23 students 9 men and 14 women, with ages ranging between 17-21 years old. The group was divided randomly into two groups, the control group and the experimental group.

Research Stages:

In the first stage of this research, we implemented a Need Analysis in order to discover the weaknesses and strengths of the students for choosing the sub-skills that were used to design

the materials; also, we applied the PET (Preliminary Enlgish Test) as the pre-test for measuring the English level of the students. (See Annex 1-2)

In the second stage, we did a rigorous search about the listening comprehension theory, the Augmented Reality technology and audio-visual materials in education; in order to better understand the process that EFL students followed at the moment of learning listening comprehension and for having a clear idea about how to design our materials for being implemented. Three learning units were crerated based on students needs shown in the need analysis and on the theory besed on listening sub-skills development. (See Annex 12). This stage was crucial to understand listening processing and designing AR materials.

The last stage in this research was analyzing the results of the implemention fo the units and comparing the pre and post test with the aim of knowing what were the effects of the implementation of augmented reality in listening comprehension the sub-skills.

Chapter IV. Results

This data analysis is based on the three project stages, the first one corresponds to the need analysis and the application of the PET, the second one to the correlation between the theoretical framework and materials design and adaptation the third one is about the evaluation of the implementation of the teaching strategy based on listening comprehension and the use of AR.

Stage one: Need Analysis and PET Listening Test

The Need Analysis showed that students had difficulties identifying unknown vocabulary, understanding context, getting main ideas, identifying specific information and tenses. Besides, with the needs analysis, we could see that the resources used during the classes are course books, videos, worksheets; but, the students showed interest in working with technological resources as Augmented Reality and technological devices, which they consider would be more useful for having real experiences that will be essential for meaningful knowledge.

According to the results of the need analysis carried out with 23 students in Intermediate English, graph #1 (See annex 1) corresponds to the first question about the importance of listening development; they think that it is important for learning vocabulary, pronunciation, for knowing the context and keeping a conversation. Also, in the second graph (See annex 1) they answered if they felt comfortable listening English audios, and 73, 9% of them said that they felt comfortable, and 26, 1% did not feel good about listening in English because they can not understand words. In the third graph they measured their own listening level in a scale from 1 to 10, where 1 is the lowest level and 10 the highest. (See annex 1).

According to these results, neither of the students considered having an excellent level in listening and none of them had the worst level.

Regarding the development in listening skill (See annex 1), 52,2% of the students understand almost everything, the 39,1% understand only some words and phrases, 4,3% understand everything and 4,3 % barely understand. Students mentioned that when they listen to podcast, interviews and dialogues, they have different issues (See annex 1), the 73,9% have problems with unknown vocabulary, 13% with understanding the context, 4,3% with understanding specific information, 4,3% identifying the tenses and 4,3% with understanding the main idea.

The table below shows some categories of the Need Analysis that we made to identify how students perform in listening comprehension, the learning styles that they usually use, and the technology and resources that they are accustomed to implement in their daily life for studying and entertainment.

Table 1

Cathegorization from Need Analysis

Cathegory	Analysis
Listening comprehension	According to the students' opinions, listening skills are a fundamental part of the English Learning process, although they present too many issues when they try to comprehend an oral message, so they think they could improve identifying vocabulary, pronunciation and accent. Thus, it was made a categorization which wrapped up most of the problems they let us know, so in that way we chose three sub-skills in which we worked in this research: *key words, listening for prediction, and listening for specific information*.
Learning styles	Most of the students use videos as learning materials and another big part of students listen to music and the rest watch images related to what they are listening to and also practice talking in English with a partner. It is clear that most of the students are visual and auditory learners.
Technology and resources	Students usually use technological devices such as laptops, smartphones and tablets in which they watch videos, play games, use websites, and listen to native people by podcast and music. Since we worked with Z generation, which as we know, are more influenced by technological devices, we decided to implement AR as a new strategy for listening comprehension.

Own elaboration

On the other hand, a PET was implemented to find out the level that students had in listening comprehension of the English language. The intermediate level, 24 students at Universidad la Grancolombia took a PET, which was elaborated considering the format of Cambridge tests for measuring their listening performance, composed by 4 parts. The first part had 5 questions with different kinds of audios where students had to choose the *correct image*; the second part was composed by 5 questions with *conversations* between people and the students selected the correct option; the third part was about *completing a dialog*, so it was

necessary to fill some gaps; and finally the fourth part, with 5 questions related to *an interview*, where the students must choose the correct option related to the question, where they needed to listen to different situations as dialogues, news, and interviews about daily life, work, hobbies, etc… It was found out that students did great in the listening part in a general way, however, they presented many difficulties understanding specific information, descriptions, details, comprehension, and conversations in the real context.

In the first part, we evaluated specific information and in all the questions, most of the students had correct answers. In the second part, the *specific information* sub-skill was evaluated and we found that compared with the first part, there was a higher quantity of students that had incorrect answers. In the third part, we evaluated *key words* but none of the students had correct answers, instead of that, just a few of them tried to complete all the spaces, but in those spaces, the majority of the answers were wrong. It was a very difficult exercise for them. Within the fourth part, the questions were focused on *general information* and the difference between correct and incorrect answers was not considerable.

The next table will show a deep analysis we did base on some sub-skills that were identified as weaknesses that students showed in both the need analysis and in the PET, in order to establish the sub-skills in which we will work on the research. These sub-skills are, listening for specific information and listening for key words. Additionally, listening for prediction was chosen as the third sub-skill to be enhanced because we followed the listening comprehension theory that was mentioned before. We wanted to help students get involved in a more real context where they could use their prior knowledge, and also get clues about what they were going to listen to from the AR environment.

Table 2

PET (Preliminary Test).

Category	*Analysis*
Specific Information	In the first section, students had a poor performance since they had more wrong answers than correct answers, and the quantity of students with wrong answers was higher.
Key Words	None of the students had correct answers, instead of that just a few of them tried to complete all the spaces, but in those spaces, the majority of the answers were wrong. It was a very difficult exercise for them.
General Information	Students are not totally able to analyze or come up with general information extracted from an audio because they made too many mistakes at the time of recognizing the general information, however, they understood isolated ideas.

Own elaboration

STAGE 2: Listening comprehension theory and materials development

Triangling the listening comprehension theory with the information in the Need analysis and the results from the PET, we made a decision about the content and development of three didactic units. We considered the listening theory that mentioned the importance of the recognition of context, sounds and visual inputs, among other characteristics. We also took into account Vandergrift & Goh (2012) for explaining that listening is a circular process that begins when the listener receives the message, then understands the message, evaluates the message, and finally, is able to respond.

We also used the listening comprehension theory that explains the cognitive process that listeners follow during listening, and it is composed by *bottom-up* in which the listener divides

the sounds for interpreting the whole message and the *top-down* process that is the application of context and prior knowledge for better understanding the message.

The units were divided into pre-listening for activating the previous knowledge and helping at the time of predicting (See annex 12) the during listening activities where they start implementing the bottom-up process with AR (See annex 12), and finally, the post-listening goes hand by hand with the metacognition because the listener is able to analyze, reflect, discuss, and conclude something about what they just heard and they start being aware of what they listened (as seen in theoretical framework).

In this research the AR was implemented with some audios from the web, the AR graphics were virtual representations of the audio, these representations were designed in specific programs by us from the beginning until the end. First, we used the "*Blender "* program for creating the figures one by one and joining them to finally obtain 3D graphics. Therefore, we developed 2D images created in *Photoshop* program for being uploaded to *Vuforia developer* that turns it into *markers* that are recognized by different technological devices for projecting the 3D graphics at the time of becoming AR.

Then, the program *"unity"* was implemented for charging the graphics already made and joining all the 3D graphics which were created in *"Blender"*, the audio and the markers for having the complete AR representation. Finally, when everything was correctly adjusted it was designed with the *APK,* that is an application for download in different technological devices in order that the camera recognizes the markers and shows the 3D graphics at the same time the audio was reproduced

STAGE 3: Units Implementation

For this stage, we used the information collected from the evaluation questionnaires where the whole curse worked in the unit. For the implementation of the units, in the pilot unit we started working with the students in the pre-listening activities by introducing unknown vocabulary, pronunciation and an introductory question, in this part the students answer questions, repeat and participate in the different activities proposed, in the meanwhile, we did an observational and interactional process with them.

Then in the during listening part, students should use the APK for watching the graphics and listening the audio at the same time, then they had some time for answering the questions by a google questionnaire for evaluating their comprehension, finally, the post-listening was provided as well in a google questionnaire where they should answer some questions related to the audio's topic, and some other questions about their personal process during the activities and about AR process with the aim of evaluate the material.

In the first unit (See annex 12), the pre-listening activities were developed with all the students together in the same way that in the pilot, with a introductory question, unknown vocabulary, and pronunciation, in order to keep working with the prediction; for during-listening part we divided the students in two groups, one of them worked with AR materials and the other in a more traditional way with just the audios, then, they followed the same process with the questionnaires for answering the interrogatives about what they heard and saw, depending on the case, but they managed the same questions. For the post-listening part they answered two different questionnaires in order to check their personal process, the process with AR and related

to pre-listening activities. Finally in the second unit (See annex 12), we kept working with the students in the same way that we did previously with the first unit.

Below, it will be shown the different analyses that were found during the gathering of information provided by the questionnaires filling.

Table 3

Units' development

Categories	*Analysis*
Pre-listening	Taking into account all the Didactics Units and the answers given by the students, those activities helped them to recognize vocabulary and context when listening (Annex 12).
During Listening	In the pilot unit all the students worked together with AR and almost all the questions were correctly answered but they failed in questions about specific information. In the first unit the students were separated in the control group, that worked without Ar and experimental group which worked with AR, in both cases the students showed an improvement in specific information questions but they had problems at identifying general information In the last unit, they also worked in the groups already mentioned. In the control group the differences among correct and wrong answers were very few, in contrast with the group that worked with AR, because they showed a huge improvement since almost all the students had correct answers.
Post-Listening	*Personal process:* Taking into consideration the units analysis, the students felt that pre-listening activities were important for understanding the audio with and without AR, but the students who worked with AR explained that graphics were the best tool because it was a key aid that really helped them at the time of seeing what they heard since they were able to articulate the vocabulary and identifying the context in the audio. *Augmented Reality development:* In all the units, the students thought that the AR graphics were really useful for identifying what they were hearing in the audio, however, some of the presented troubles with the internet or APK, so they could not see the graphics.

Listening Comprehension	*Listening for prediction:* During all the process the pre-listening activities that were made with the purpose that students could predict what they will listening to had been the most surprising step due to, the big reaction that students had at knowing the vocabulary and predicting the context since it was easier for them to understand the audio. This is really amazing because usually in the listening activities for EFL the prediction activities do not exist. *Listening for key words :* This sub-skill was the one that showed the best results on account of gaining the vocabulary acquired by students that were essential for the development of upcoming activities, since they could identify main vocabulary. *Listening for specific information:* Working this sub-skill was the most difficult thing for the students because they did not show a big improvement at recognizing specific information in the audio. Going along with the three units they presented some advanced with this it was still hard for them.

Own elaboration

The next table is about the comparison between the results of the pre- test and post- test in order to analysis the work realized with the students with the AR materials and the traditional materials with the aim of knowing if the materials created had a good result for listening comprehension in the three sub-skills (prediction, key words and specific information) or not.

Table 4

PET and pos-test comparison

Category	*Analysis*
Pre-test Post- test parallel	This test was composed of questions about specific information, key words, and some general information. In all the test, students showed an improvement in comparison with the pre-test. Due to just a few questions, the majority of the students answered wrong but the difference among those that answered correctly was too narrow. However, talking about the test in general, students did better answering questions about specific, key words and general information.

Own elaboration

All this process, showed us that AR materials are good tools for students to work listening comprehension, since the auditory-visual process helped them to create connections about what they listened and saw at the same time, but those aspects that had an impressive influence in listening comprehension and the development of sub-skills were all the steps that listening comprehension theory provides, following the pre, during and post-listening activities, due to the knowledge acquired by the students when they were developing the activities most of all when they did pre-listening part was the complete process that they should do for achieving an improvement because with this we corroborate that listening comprehension process does not only require a visual input but also different aspects that help with the misunderstanding or lack of vocabulary knowledge, miss of adaptation of the accent and conversations in real context that were the principal problems that students had at the beginning of the process.

Conclusions

Previously to the development of the material with AR we had some difficulties since we did not know how to complete this process, that's why it was necessary to look for different tools, softwares and ideas for figuring out how to create the AR environments by joining real objects (markers) and 3D graphics.At the moment of joining the graphics in the AR environment, we had some troubles because the programs did not recognize some special textures, colors among others of the graphics and we have to change.

It must be said that elaboration of these kind of materials are not recommended to be created by teachers because it requires too much time, effort, creativity, and software knowledge. We suggest that those teachers who are experts in didactic materials development, could be encharged of the creation of this kind of materials to save time.

Regarding the pandemic situation we did not have full control over the students working with the units because we were not able to see what they were doing and it was not possible to supervise or review how they managed the apk and the units due to the fact that we were under virtual modality. Talking about the virtual modality it was impossible to manage how many people were connected to the class who filled the online questionnaires, and that stuff happened because some students presented Internet issues, problems at the time of managing the apk and some problems with the quality of the graphics due to the students' devices.

Bearing in mind the technological resources needed, it is necessary to have high quality devices in order that the APK runs well and the graphics can be seen clearly without any problem about the pixels.

We consider this kind of research very useful because it was something innovative due to the fact that we worked with augmented reality articulated with the listening skill which is one of the hardest skills at the time of learning a language. Thus, when we collected the information, it was an exhausting process because it was necessary to categorize all the information regarding the sub-skills that were the focus of our research. Also, doing a research process is not that easy because it demands a lot of time, effort, imagination, and creativity for coming up with something that can be useful for the learning and teaching process, despite this we as researchers felt a lot of satisfaction because we learned a lot referring to the theoretical part and the creational part that involves all the material creation, and as well we felt grateful for the result that was obtained and the information collected since the results were positive, without mentioning that there were some problems.

After collecting all the information, we noticed that although both groups performed well, the experimental group got better results than the control group. Reconsidering all the processes done, we can tell that the pre-listening part, which are activities for making a prediction about the possible context and topic of the audio is fundamental for students, and it should be included in the international exams because when we are developing the listening skill in real life, we actually have a real context to rely on.

In addition, international exams should incorporate visual input because it helps students to make a relation between what they are listening to and what they are watching because when we are having a real conversation, we can see the gestures and movements of the speaker and sometimes that help us to figure out what they are talking about.

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Annexes

Annex 1: Need Analysis

Annex 2: Listening PET

Annex3: During Listening Pilot

Annex 4: Post Listening Pilot

Annex 5: During Listening unit 2

Annex 6: Post Listening AR unit 2

Annex 7: Post Listening control group unit 2

Annex 8: During Listening AR unit 3

Annex 9: During Listening Control group unit 3

Annex 10: Post Listening AR unit 3

Annex 11: Post Listening control group unit 3

Annex 12: Booklet units 1.2.3