

TRABAJO DE FIN DE GRADO



Exploring the educational and motivational potential of
virtual reality based apps in foreign language learning

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ABSTRACT

Due to technological advancements, new tools such as Virtual Reality (VR) have been developed, whose usefulness has been explored in various fields, including education. Thanks to this, VR language learning is becoming increasingly popular. The purpose of the current study is to explore the potential of VR to improve the teaching-learning processes of foreign languages. To this end, first a literature review has been done on the use of VR for educational purposes and especially foreign language learning and then an analysis of two VR apps. Additionally, with the purpose of gathering valuable user feedback, a quasi experimental study was carried out with 30 English language learners. The study involved the testing of the two apps analyzed, as well as the evaluation of both apps in terms of usability, usefulness, attitude towards using, intention to use, playfulness and anxiety.

KEYWORDS: Virtual Reality, Virtual Learning Environments, VR Technology, VR Headsets, Foreign Language Learning.

RESUMEN

Debido al avance de la tecnología, se han desarrollado nuevas herramientas como la Realidad Virtual (RV), cuya utilidad se ha explorado en diversos campos, incluyendo la educación. Gracias a esto, el aprendizaje de idiomas mediante RV también está ganando popularidad. La finalidad de este estudio es mostrar el potencial de la RV para mejorar los procesos de enseñanza-aprendizaje de lenguas extranjeras. Para ello, se ha revisado la literatura sobre el uso de la RV en educación y más concretamente en el aprendizaje de lenguas extranjeras y posteriormente se han analizado dos apps de RV. Adicionalmente, con el objetivo de recoger *feedback* de los usuarios, se ha realizado un estudio cuasi experimental con 30 estudiantes de inglés. El estudio implicó la prueba de las dos apps analizadas, así como la evaluación de ambas en términos de usabilidad, utilidad, actitud hacia su uso, intención de uso, carácter lúdico y ansiedad.

PALABRAS CLAVE: Realidad Virtual, Entornos de aprendizaje Virtuales, Tecnología RV, Aprendizaje de lenguas extranjeras.

1. INTRODUCTION

Nowadays there is a growing interest in the development of Virtual Reality (VR), which is an increasingly accessible and affordable technology to users. Despite the fact that VR up to now has been used mainly “to enhance learning processes in the area of science, they are drawing increasing attention in the areas of humanities and social sciences, including foreign language learning” (Berns, Mota, Ruiz Rube & Dodero, 2018, p. 777).

In the area of foreign language learning numerous VR-based apps have been developed in order to facilitate the teaching-learning process. Many of those apps, are available on commercial platforms such as *Apple App Store* or *Google Play Store*. However, a look at the currently available and accessible apps confirms that very few of them explore the real potential of VR technology (Berns et al., 2018). And thus researchers such as (Berns et al., 2018) have pointed out that most of the currently available apps are quite similar to other more conventional learning tools. This means, that -in terms of learning contents- they do not provide any innovation beyond immersion since “most of them offer its users with very conventional and drill-based grammar, vocabulary and pronunciation exercises” (Berns et al., 2018, p. 777).

My interest in VR arises from the increasing expansion and popularity of VR technologies in all areas of knowledge and my personal interest in exploring the ways in which these could be applied in education and especially foreign language learning, what innovations and advantages they could offer to language learning processes. As a language learner and teacher I am interested in the added value that VR technology currently provides (and can provide in the future) teachers and learners with. In this sense, several researchers have pointed out that by using VR technology in the area of education and conducting further research into its effectiveness, VR could provide equal education opportunities for all students regardless of their circumstances (Frazier, Bonner & Lege, 2018, p. 215).

In this context, the present work aims to explore the possibilities offered by VR at present, as well as its potential to improve the teaching-learning processes of foreign languages in the near future. For this purpose two apps will be analysed, *ImmerseMe* available for PC, mobiles and tablets' browsers and *VR Education and Learning 360*, available at Google Play Store.

2. STATE-OF-THE-ART

2.1 Virtual Reality and education

The concept of VR has existed for a long time but has evolved with the emergence and development of new and more sophisticated technologies. Currently, VR is defined as “replacing one’s surroundings with new digitally created environments through the use of a head mounted display, provid[ing] a way to immerse users in wholly novel situations and environments” (Lege & Bonner, 2017, p.149). This definition applies to the use VR-technology through head-mounted displays that allows a greater sense of *presence* (which is its most remarkable feature) fostering increased learning and performance through students’ immersion and involvement (Cheng, Yang & Andersen, 2017). The sense of presence is the psychological sensation that users have of actually “being” or “existing” in the virtual environment they are immersed in (Baños, Botella, Rubió, Quero, García-Palacios & Alcañiz, 2008).

At present, VR is used in areas such as design, entertainment and science. In addition, different fields of knowledge have started exploring, developing and applying VR technology for educational purposes to reinforce and practice learning contents. In fact, several studies have pointed out that VR can change how students learn from a conceptual to an experiential approach (Abd Majid, Ismail, Kassim, Kassim & Abu Bakar, 2018) since VR technology provides the opportunity to create immersive and realistic environments in which the user can directly interact with the environment and its content (Berns, Ruiz-Rube, Mota, Dodero, Castro, Ryyananen & Werner, 2019). VR offers the possibility of recreating any kind of scenario, even those which might be difficult to recreate in a conventional classroom. Some scenarios require a technical deployment and resources that may not be available nor affordable (Abd Majid et al., 2018). Hence, the use of VR technology could imply cost reduction. Moreover, VR provides institutions with the opportunity to offer practices to a higher number of students and thus to improve their abilities. Additionally, VR can be adapted to students’ specific needs (Abd Majid et al., 2018) allowing them to practice in a safe environment where they can fail, pause and repeat the training as many times as needed (Cheng et al, 2015). This is very practical especially for those practitioners (e.g., such as doctors or pilots) whose practices could put in danger the safety or health of other people.

Apart from the educational potential of VR technology, several researchers have stressed its motivational potential especially for those students, who show positive attitudes towards the use of VR (Kaplan-Rakowski & Wojdyński, 2018).

Nowadays, VR based apps allow people to visit virtually different countries and places around the world. That means, VR users can access and explore places that have either already disappeared or that are usually difficult to visit since they would require the user to travel far away. An example for such an app is *Makka VR* (available at *Google Play Store*) that allows anyone to tour the sacred cities of Islam, Mecca and Medina, which generally can only be visited by Muslims, thus breaking religious and socio-cultural barriers. Another example is the *PathoGenius* app whose objective is to offer medicine students the possibility to practice situations such as making a diagnosis (Makled, Walied Yassien, Elagroudy, Hamdi, Abdennadher & Magdy, 2019). There are also apps that allow students to practice surgery (and other medical abilities) in a VR-based environment providing thus valuable opportunities to practice fundamental professional skills and learning contents (Pensieri & Pennacchini, 2014). However, one of the main advantages of using VR in medicine is that it “minimizes the risks on patients and students associated with real training” scenarios (Makled et al., 2019, p.1) allowing for a deeper understanding that often cannot be achieved by other means (Pensieri & Pennacchini, 2014). Other fields where VR is used are aviation and marine engineering. In aviation, VR is used as an aircraft simulator whose aim is to provide students with the opportunity to practise and improve piloting skills in different conditions (e.g., storms, turbulences, etc.) (Pensieri & Pennacchini, 2014). The Marine Engine Simulation System (MESS) is applied in the area of marine engineering. Students who used to learn memorizing concepts from textbooks now are able to put into practice what they have learnt in a virtual environment (Abd Majid et al., 2018). In education, VR is not only offering new opportunities and tools to students from all ages and educational stages in general, but also to those who have special needs or different capacities, thus achieving equal opportunities for all. For example, in children with “Autism Spectrum Disorders” (ASD), the immersive and realworld-like environment in which they are submerged through VR allow them to acquire important skills such as, social abilities and conventions, which they can later apply to their daily life (Pensieri & Pennacchini, 2014).

2.2 Virtual Reality and foreign language learning

Although VR is applied in various fields of knowledge it “has not been typically applied to advance” in the field of foreign language learning (Frazier, Bonner, & Lege, 2018, p. 15). Instead, other technologies such as virtual worlds, social networks, mobile apps or video games have been (and are increasingly) explored as a way to teach and learn foreign languages (Berns, Gonzalez-Pardo & Camacho, 2013; Berns, Isla-Montes, Palomo-Duarte & Doderó, 2016; Frazier et al., 2018).

In fact, in the area of foreign language learning there are still very few apps that explore the real potential of VR technology to create and provide novel learning scenarios. While some of the currently available apps on commercial platforms such as *Learn English with VR* or *Beyond VR* are -for sure- very useful to support language learning (especially to reinforce listening and speaking skills) a look at the learning contents and approaches provided suggests that most of them still follow a traditional learning approach focusing on the learning of grammar, vocabulary and pronunciation through drill-based or, sometimes, multiple choice exercises (Berns et al., 2018). In this sense, the majority of VR language learning apps offer little beyond immersion, as they provide similar contents to other more conventional teaching-learning approaches.

However, the use of VR technology for language learning entails many advantages since it allows the user to immerse in real world-like environments (e.g., hospitals, restaurants, etc.) which are often not only difficult to recreate in a conventional classroom setting but also expensive. This way, learners can directly interact with the environment and chatbots to practice the target language, which is especially advantageous for those students who for economic, time or lack of opportunity reasons cannot make a linguistic immersion in the country where the target language is spoken (Legault, Zhao, Chi, Chen, Klippel & Li, 2019). Hence, educational opportunities for all students are matched regardless of their circumstances. VR allows to practice in depth speaking and pronunciation abilities, which are difficult to perform with conventional methods more focused on language's official written form (writing, vocabulary and grammar) (Korkalainen, Pääkylä, Liukkonen, Järvenpää, Mäkilä, Lappalainen & Kamppari, 2015). Thanks to the possibility of simulating real-life situations in a private and safe environment “the students can comfortably experiment with

different approaches to the same situation without the fear of being judged for mistakes. This encourages the learning of new language skills and promotes the culture around the language itself” (Korkalainen et al., 2015, p.1) reducing learning anxiety and inhibition while promoting autonomous learning, self-efficacy and creativity (Lin & Lan, 2015).

An app which intends to explore novel ways of learning is *Let's date!*, a VR-based mobile app that has been developed by researchers from the University of Cádiz and which aims to reinforce students' listening and speaking skills by using chatbots (Berns et al., 2019). A chatbot is a software program able to simulate human conversations with the users employing natural language (Berns et al., 2018). *Let's date!* aims to explore the motivational potential of popular topics such as finding the ideal partner to engage learners in practicing different language aspects and skills. To this end, the app imitates the dynamic of popular apps such as *Tinder* or *Badoo*, that help its users to find a partner by indicating a detailed personal profile as well as a description of their ideal partner to later be paired with the person with whom they fit better and go on a date. Another interesting project is *The Developing Virtual Learning for Finnish project*, whose purpose is to set guidelines to evaluate educational experiences in VR. They developed a demonstrative app to improve student's language skills in Finnish as a foreign language, that recreated real world situations in a virtual environment (in this case the restaurant car of a train) (Korkalainen et al., 2015). It allows students to practise listening and speaking, but also reading since the spoken dialogues are subtitled (Korkalainen et al., 2015). Another study that highlights the learning potential of VR is the one carried out by Legault et al. in 2019, where a group of students learned Mandarin Chinese vocabulary. Learners had to explore and interact in a kitchen and in a zoo virtually recreated to learn new vocabulary. Finally, *Crystallize* is a very innovative project developed by Cheng et al. in 2015 to teach language and culture. *Crystallize* is a PC interactive VR game to learn Japanese in which players must interact with the environment (that presents traditional Japanese elements as tatamis) and chatbots, to acquire new vocabulary words. These words must be used later to solve tasks, such as making new friends or getting a job (Cheng et al., 2015). *Crystallize* also helps to improve cultural competence, specifically nonverbal interaction (as how and when to bow, for example) that has a substantial role in communication (Cheng et al., 2015).

3. PURPOSE AND HYPOTHESES

The present paper aims to explore the potential of VR technology to foster foreign language learning. For this purpose, two hypotheses (H1 and H2) are stated:

H1: VR technology provides novel opportunities to increase language immersion and to provide learners with “real world” scenarios.

H2: The use of VR technology and headsets could increase students’ learning and motivation towards language learning.

4. METHODOLOGY

To find evidence in support or against H1 and H2 first, a review of the literature has been done and then a quasi experimental study. The latter consisted in first, doing a descriptive analysis of two VR apps and then in testing them with English language students. With the purpose of gathering students’ feedback we asked them to fill in a questionnaire once they had tested one of the two apps. The questionnaire was based on the Technology Acceptance Model (TAM) developed by Davis (1989) and aimed at gathering students’ opinion on aspects such as user acceptance, usability, usefulness, attitude towards the VR apps tested, intention to use them and playfulness, as well as the possible anxiety derived from their use.

The apps that have been used for this study were *ImmerseMe* (not available to be used with VR headsets yet) and *VR Education and learning 360* (which can be used with VR headsets). By analysing two different kinds of VR apps (one that can be used with highly immersive tools such as VR headsets and another one that does not allow the use of headsets) we intended to compare the functioning and learning resources of both apps. This comparison also allowed us to identify the added value of VR technology when used with VR headsets.

5. ANALYSIS

In order to analyze the possibilities that VR technology offers nowadays to increase students' motivation and learning outcomes and thus to enhance the teaching-learning processes of foreign languages in the near future, first a descriptive analysis of the two apps will be carried out.

The analysis will be carried out focusing on the linguistic contents (vocabulary, grammar, pronunciation, oral comprehension, oral expression, reading) and language competences addressed by each of the apps as well as the teaching-learning approaches provided. Finally, both apps will be evaluated from the user's point of view; that is in terms of user acceptance and attitude towards the respective app as well as in terms of usability and usefulness to support language learning. To this end 30 students who participated in the current study were asked to fill in a TAM questionnaire once they had tested one the apps proposed for the current study.

5.1 Descriptive Analysis of *ImmerseMe* and *VR Education and Learning 360*

The descriptive analysis of both apps will allow to identify firstly, the tools and resources that each one offers to enhance the teaching-learning process and secondly, to find evidences against or in favour of the first hypothesis (H1: *VR technology offers novel opportunities to increase language immersion and to provide learners with "real world" scenarios.*)

5.1.1 *ImmerseMe*

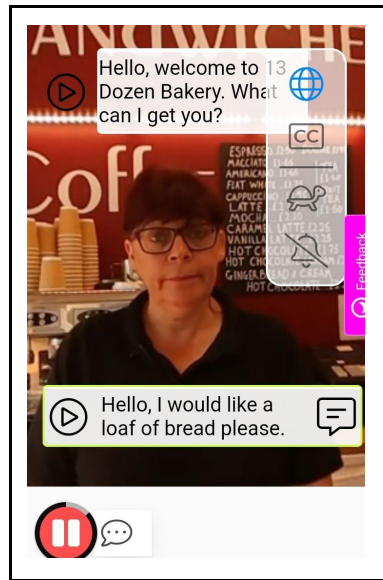
ImmerseMe is a foreign language learning VR app designed, at the moment, to be accessed on devices such as computers, mobile phones and tablets through the browsers Chrome, Safari and Firefox, but without the possibility of using a head mounted display. Nonetheless, the company is planning to launch soon the app version to be used with VR headsets such as Google Cardboard, Vive, Rift or Gear VR (ImmerseMe Team, n.d.). *ImmerseMe* is a 360-degree app that allows learners to explore and interact with the VR environment by clicking and dragging with the mouse on different areas of the screen -hence

allowing the user to explore the VR environment from different perspectives and angles. The latter is supposed to favor students' immersive experience and engagement.

ImmerseMe allows students to learn and practice 9 languages (e.g., German, Spanish, French, English, Japanese, Chinese, Italian, Greek and Indonesian). The content of the app is divided into three levels depending on learners' proficiency in the target language: beginner, intermediate or advanced. Moreover, thanks to the *Teacher Dashboard*, teachers can assign lessons, tasks and homework to their students as well as follow their progress and hence easily evaluate them (Cardwell, 2020). The *Teacher Dashboard* allows teachers to know how much time their students have practiced and how accurately their speaking was, as well as how many points they achieved. In addition, the app offers four learning modes each one of which provides a different type of activity to practice the target language. Activities are based on pronunciation, dictation (typing), translation or immersion; the latter being the most relevant mode for the current study. Furthermore, each level offers a wide range of topics and situations, from trivial issues such as hobbies or journeys, academic subjects such as geography, history or science up to current issues of international relevance such as politics, migration or the environment. Therefore, apart from practicing and improving different aspects (vocabulary, grammar, fluency) and competences (listening, speaking, reading and writing) related with the target language, learners also get the opportunity to acquire knowledge and vocabulary beyond the one strictly related to the target language area. For each topic the user is provided with the key vocabulary and grammar as well as a lesson sheet to review the contents learned as many times as needed. In addition, the layout of each lesson can be adapted to match both the curriculum plan (if any) of the educational center interested in implementing *ImmerseMe* as a teaching/learning tool, as well as to meet students' personal learning needs.

With regard to the first mode ("Pronunciation Mode"), learners are invited to interact with a chatbot by answering different questions (Figure 1).

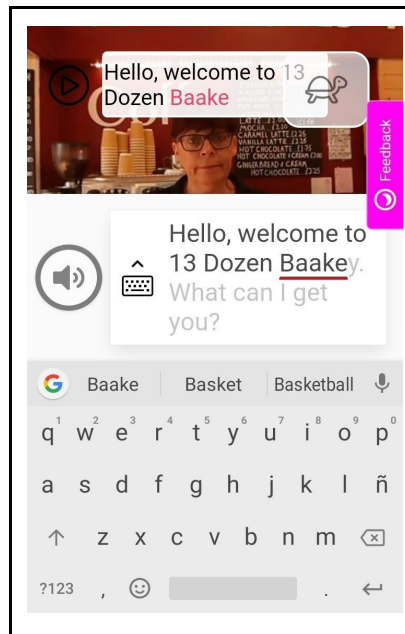
Figure 1. Example from the “Pronunciation Mode”.



As illustrated in Figure 1, the app provides learners with one or more answers to choose from while at the same time requiring learners to correctly pronounce the given answer so that the dialogue can proceed. Answers are subtitled and can be heard spoken by a native speaker by means of different audio files. Audio files can be repeated as many times as necessary, so that learners can work on their pronunciation and intonation according to their needs. The same applies to the questions and answers provided by the chatbot which can also be repeated, in line with the learners' needs. Moreover, the speed of the audio files can be regulated, lowering its speed from 100 percent to 75 percent. This together with the fact that all dialogues appear with subtitles allow the learners to work on their speaking, listening and reading skills.

With regard to the second mode (“Typing Mode”), it requires learners to correctly type the dialogue that is delivered by means of an audio file. In case the learners make mistakes, they are marked in red and the dialogue does not proceed (Figure 2). Additionally, visual feedback (by means of colours) aims to help students to improve their listening and writing skills.

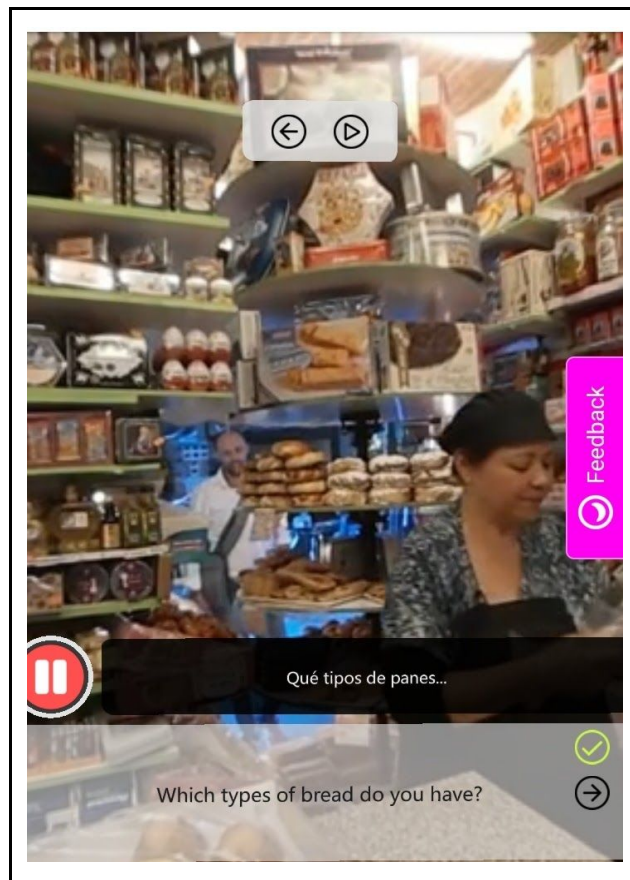
Figure 2. Example from the “Typing Mode”.



Regarding the third mode (“Translation Mode”), it requires learners to translate orally a dialogue from their mother tongue into the target language. For this purpose, learners are invited to interact with a chatbot in the target language, allowing them to practice their listening and speaking skills. Once the chatbot has delivered a question and/or statement, the learners are provided with different options of answers. The latter appear subtitled on the screen in the students’ mother tongue. Following this, the students must translate and record their answers into the target language orally, as it can be appreciated in Figure 3.

As in the previous modes (“Pronunciation” and “Typing” modes), the speed of the speech can be lowered, the audio can be repeated as many times as necessary and the dialogue does not proceed until the previous task has been carried out correctly.

Figure 3. Example from the “Translation Mode”.

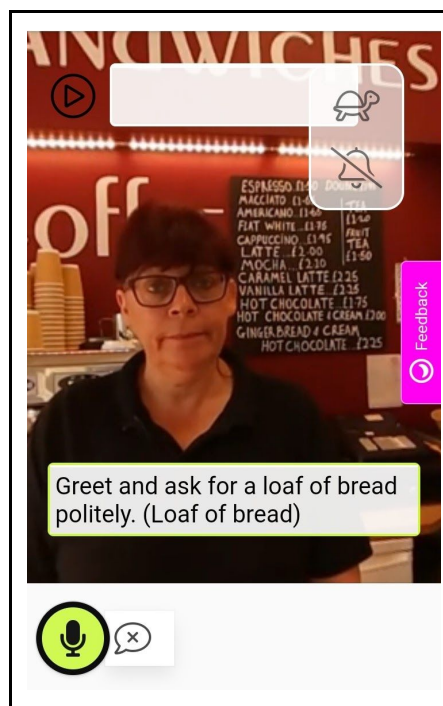


Finally, with regard to the fourth mode (“Immersion Mode”) it consists in offering learners the opportunity to interact with a chatbot in “real life” environments and to perform “real life” activities. Those activities are usually related to the cultural background of the target language. For instance, if learners are studying Mandarin Chinese, they could be asked to buy a ticket to visit *The Great Wall* in China; if they are studying Italian, they could be asked to buy a *gelato* (an ice-cream) in an Italian *gelateria* (ice-cream shop) or if they are studying English, they could be asked to buy fish and chips in a shop. The fact that learners can perform cultural related activities not only confers a greater sense of credibility to the immersive experience but also allows learners to “experience the foreign culture by exploring authentic and contextualized learning environments” (Berti, Maranzana & Mozingo, 2019, p.47), which makes *ImmerseMe* a valuable tool for cultural learning and understanding.

Dialogues usually start with the chatbot greeting the learner and making questions on different topics. Subsequently, the app provides the learner with instructions on how to answer the respective questions. Once the learner has answered correctly (in accordance with the instructions given and correctly pronounced), the learner is allowed to succeed with the dialogue and to perform the next task.

For example, if the interaction takes place in a bakery, the dialogue will begin with the saleswoman greeting and asking the learner what s/he wants to buy (Figure 4). To this end the app invites the learner to perform the following action: '*Greet and ask for a loaf of bread politely*' (Figure 4).

Figure 4. Example from the “Immersion Mode”.



Following that instruction, the learner must answer the question as s/he likes by clicking on the audio recorder and recording his/her answer (e.g., '*Good morning, I would like to buy a loaf of bread please.*'). The “Immersion Mode” allows the learner to practice

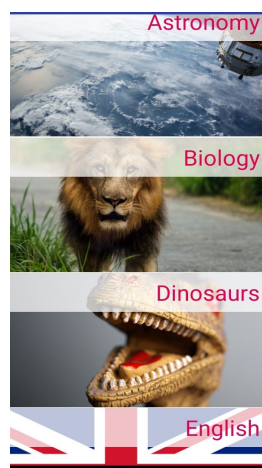
both listening and speaking skills. A notable feature of *ImmerseMe* is the absence of avatars¹, which are often used to allow learners interacting with the virtual environment. Instead, by allowing the user to experience in first person the virtual environment, *ImmerseMe* is able to increase the users' sense of immersion and engagement, because they feel as if they were in the virtual environment themselves and not simply controlling an artificial person (Korkalainen et al., 2015).

5.1.2 VR Education and Learning 360

VR Education and Learning 360 is a free educational app available on *Google Play Store* that allows the learning and practice of five different subjects: Anatomy, Biology, Astronomy, Dinosaurs and English. The app contains links to a YouTube channel that provides 360° videos with educational content. The YouTube channel can be accessed either directly from the app itself or through the YouTube channel by using a smartphone, tablet or computer. The videos can be watched both, with a VR head-mounted display (e.g., Google Cardboard) or without it. However, to increase the immersive experience and foster students' learning and engagement, the use of VR headsets is recommended.

Once learners have accessed the app, a menu appears by indicating the different subjects that can be learned with the app (Figure 5).

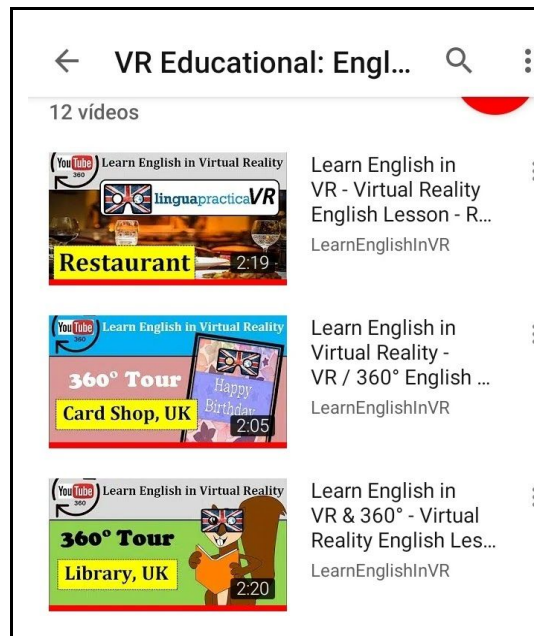
Figure 5. Snapshot of the *VR Education and Learning 360* menu.



¹ Avatars are the graphic representation of users in video games, apps and websites (Beil & Rauscher, 2018). Often, an avatar goes beyond merely graphic representation and becomes part of the virtual world itself, allowing the user to manipulate such virtual environments (Beil & Rauscher, 2018).

When students click on the section for learning English, the app redirects them to the YouTube channel, where twelve videos are stored. These videos allow students to practice the target language in twelve different settings: in a restaurant or shops such as a computer shop, a shoe shop or a clothes shop (Figure 6).

Figure 6. Examples from the menu of the *VR Education and Learning 360* YouTube channel.



Regarding the structure of the different lessons, each lesson begins by means of an audio file with a greeting and a brief introduction to the respective setting. For instance, if the lesson takes place in a restaurant the introduction will focus on welcoming the learner to a VR tour through a restaurant in London' and then introduce different vocabulary items. Each lesson lasts about two minutes focusing on five different words related to the respective setting (Table 1).

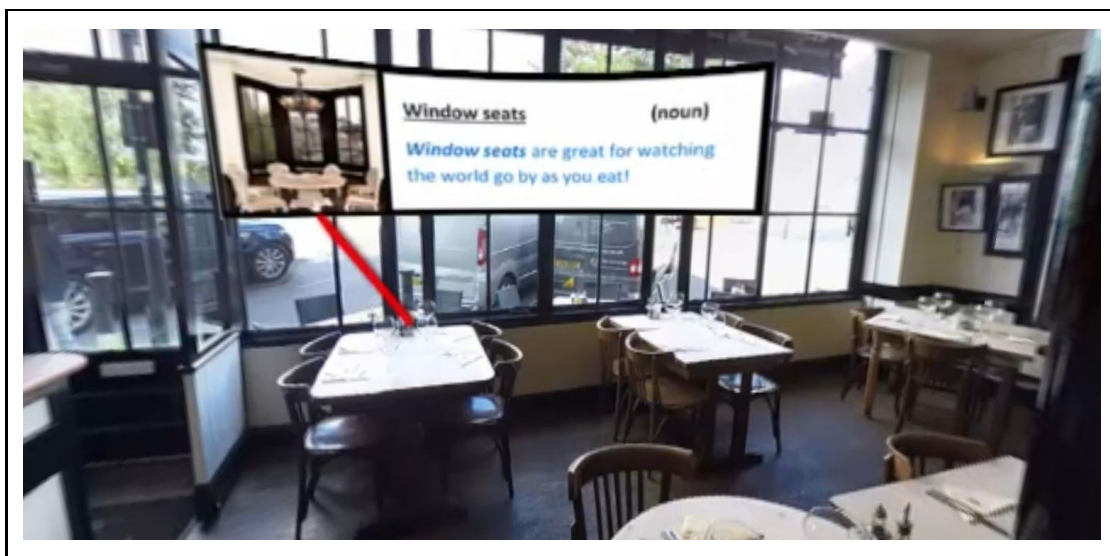
Table 1. Overview of the different settings and the vocabulary that can be practiced with the *VR Education and Learning 360* app.

Setting	Vocabulary				
Restaurant	Window seats	Cutlery	Napkin	Condiments	Wine glass
Card shop	Christening card	Graduation card	Christmas card	Knick-knacks	Birthday cards
Library	Bookshelves	Fantasy books	Historical	Large print	Fiction books

			books	books	
Computer shop	USB Stick	Keyboard	Printer	Hard drive	Monitor
Shoe shop	Brogues	Sandals	Loafers	Shoe box	Baby shoes
Art gallery	Easel	Picture frame	Art frame	Oil painting	Canvas print
Plumbing shop	Shower head	Boiler	Duct tape	Flexible hose	-----
Farm	Tractor	Chicken coop	Barn	Herb garden	Watering can
Greenwich, London	Canary Wharf	Pier	Foot tunnels	Cutty Sark	City of London
Clothes shop	Clothes rail	Changing room	Heels	Full-length mirror	Blazer
Flower shop	Vase	Pot plant	Flower wrap	Bouquet	Pink roses
Homeopathy shop	Moisturisers	Body scrubs	Makeup counter	Supplements	Hair treatment products

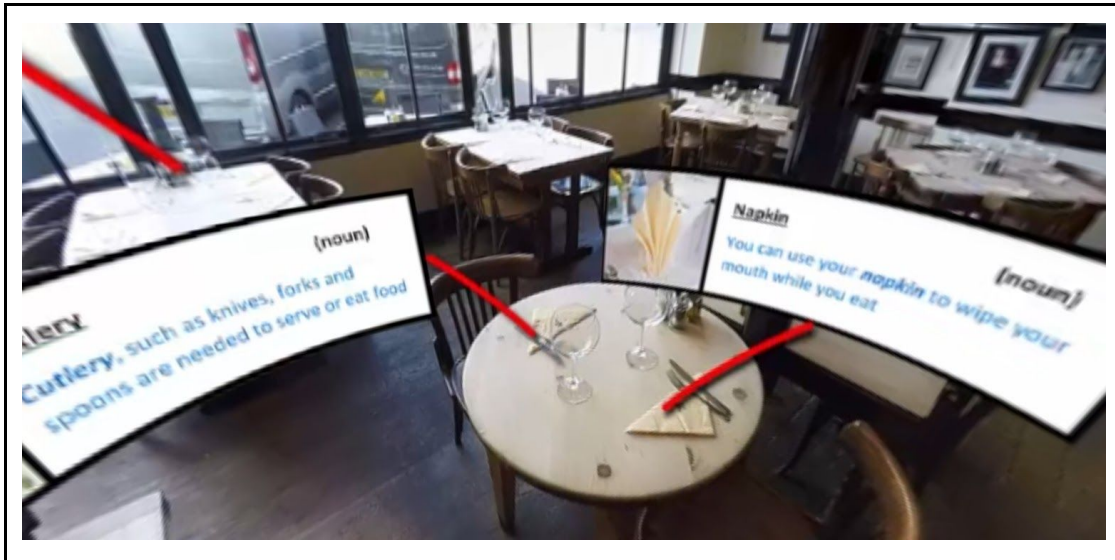
By clicking and dragging on the screen, the learners can view the virtual environment from different angles. The app provides the learners with instructions by means of different audio files inviting them to focus on the names of the objects placed in each setting. For instance, if the practice takes place in a restaurant, learners are first asked to look around and search for the window seats. To this end the learner must drag the screen to find it (Figure 7).

Figure 7. Example from the restaurant setting delivering the first task.



The objects to be searched in the virtual environment (e.g., cutlery, napkin, wine glass) are being indicated with a red arrow while the information with regard to the usefulness of each object is delivered both by means of an audio file as well as a text. The latter appears close to each object and aims at helping students to practice, amongst others, their reading skills (Figure 8).

Figure 8. Example from the restaurant setting delivering the second and third tasks.



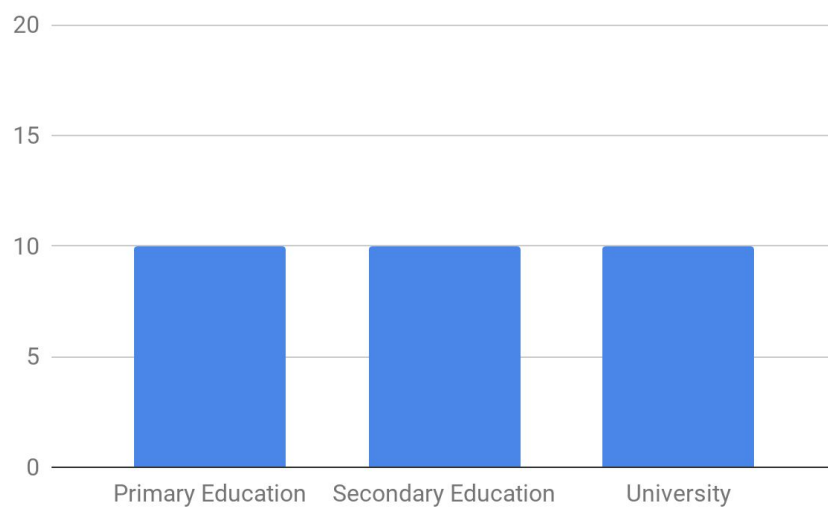
The video can be stopped by learners and played as many times as necessary. Furthermore, even when the video has been stopped by learners, they can continue looking around the environment and focus on the information delivered regarding each object. This allows learners to review the contents according to their individual learning needs while at the same time practicing their listening and reading skills as well as vocabulary. In *VR Education and Learning 360*, there is no visual avatar to represent learners, so as in the case of *ImmerseMe*, the immersive experience is experienced directly in first person. This, together with the fact that the app can be used with VR headsets, fosters the students' sense of presence, who feels as if they were actually part of the virtual environment (Baños et al., 2008).

5.2 User-focused analysis

5.2.1. Participants

In order to give answer to the second hypothesis (H2: *The use of VR technology and headsets could increase students' learning and motivation towards language learning*) a quasi experimental study was carried out, in which 30 English language students (12 men and 18 women) were first asked to test one of the apps described (*ImmerseMe* or *VR Education and Learning 360*). All participants were asked to test their respective app for at least 30 minutes and then to fill in a Technology Acceptance Model (TAM)-based questionnaire. The participants were from different educational levels and institutions: 10 A level Primary Education students, 10 B level Secondary Education students and 10 C level from the University degree of English Studies (Figure 10).

Figure 10. Number of participants from each educational level.



5.5.2. Instruments

The TAM-based questionnaire that was used for the current study was based on a 5 point Likert scale (“strongly disagree”, “disagree”, “agree”, “strongly agree” and “I do not know”) with a total number of 28 questions in the case of *ImmerseMe* and 23 questions in the case of *VR Education and Learning 360* (Table 2).

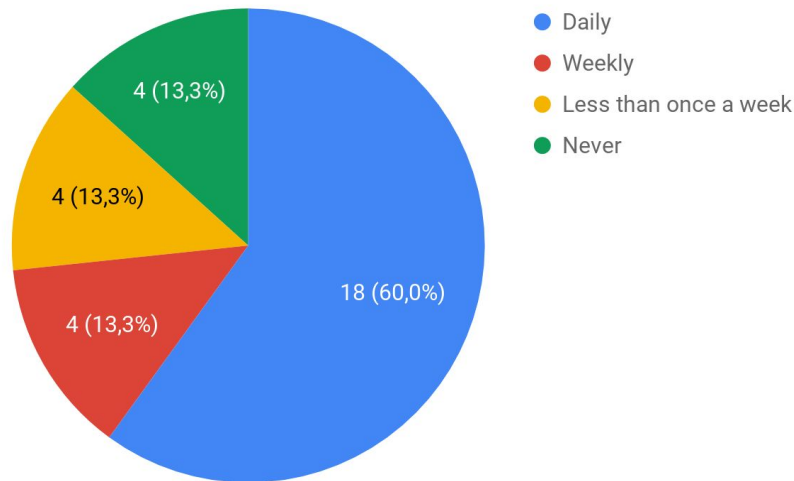
Table 2. Questions from the TAM-based questionnaire related to the aspects analysed.

Perceived Ease of Use (PEU)
PEU 1- The app is easy to use.
PEU 2- Getting used to the app's handling is fast.
Perceived Usefulness (PU)
PU 1-The app helps to learn vocabulary.
PU 2-The app helps to improve listening skills.
PU 3-The app helps to improve speaking skills.
PU 4- The app helps to improve reading skills.
PU 5-The app helps to improve pronunciation and fluency.
PU 6-The app encourages me to express myself more accurately.
PU 7- The app encourages me to pronounce more accurately.
PU 8-The app allows to learn about the cultural background of the target language.
PU 9- The app allows to learn a language in context.
PU 10- In general, the app is useful to learn languages.
PU 11- If the app was available to be used with VR headsets in smartphones it would help me for my language learning. *
Attitude Toward Using (ATU)
ATU 1- I like the idea of using this kind of app to learn languages.
ATU 2- This app increases my motivation towards language learning.
ATU 3- I would recommend this kind of app for learning languages.
ATU 4- I would like this app to be available for smartphones and to be used with VR headsets to get a greater feeling of immersion.*
Behavioural Intention to Use (BIU)
BIU 1- I would use this app to learn other languages.

BIU 2- I would use this app for my language learning if it could be used with VR headsets.*
Perceived Playfulness (PP)
PP1- The app makes me lose all sense of time.
PP2-The app's immersive experience manages to detach me from everything around me.
PP3- The app's immersive experience makes me feel as if I was actually part of the virtual environment.
PP4- The app makes learning fun and entertaining.
PP5- If the app could be used with VR headsets, the learning experience would be even more funny and the sense of immersion greater.*
Anxiety (AN)
AN1- The interaction with the app makes me feel nervous.
AN2- The interaction with the app makes me feel dizzy.
AN3- The interaction with the app generates in me feelings of rejection towards its use.
AN4- If the app was available for VR headsets, the interaction with it would make me feel nervous and/or dizzy, generating feelings of rejection towards its use.*
* = Questions only used for the questionnaire on <i>ImmerseMe</i> app.

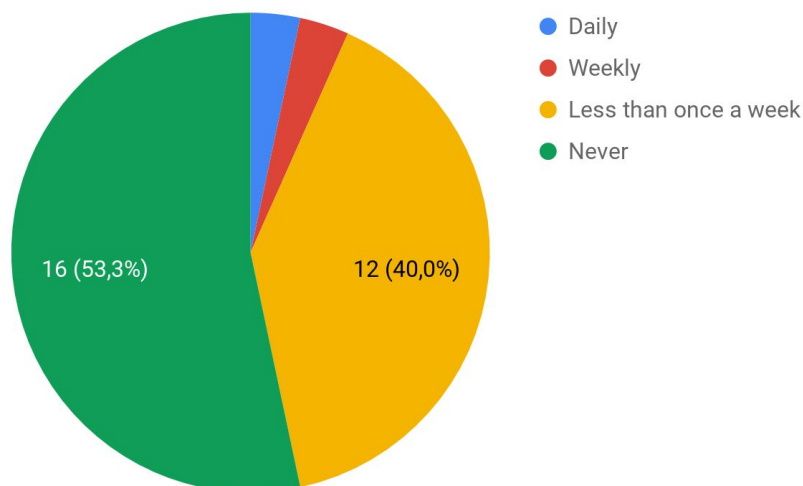
Apart from the questions strictly related to students' evaluation of the learning experience, 5 moderating variables (MV) that we considered relevant for the current study have been asked. Those variables were related to the participants' age (MV 1) and gender (MV 2), to the frequency with which they usually use video games and/or virtual worlds (MV 3), VR based mobile apps with VR headsets (MV 4) or language learning mobile apps as Babel, Duolingo, etc. (MV 5). With regard to the third variable (MV3: *How often do you play video games and/or virtual worlds?*), 18 (60%) students affirmed that they use them on a daily basis while only 4 students (13,3%) stated that they never use them (Figure 11).

Figure 11. Student's frequency of using video games and/or virtual worlds.



With regard to the fourth variable (MV 4: *How often do you use virtual reality based mobile apps with VR headsets?*) the data indicate that the majority of the students are not familiarized with (or used to) the use of VR headsets, with 16 students (53,3%) stating that they never use them, 1 student (4,85%) using them on a daily basis, another one (4,85%) using them on a weekly basis and, finally, 12 (40%) students less than once a week (Figure 12).

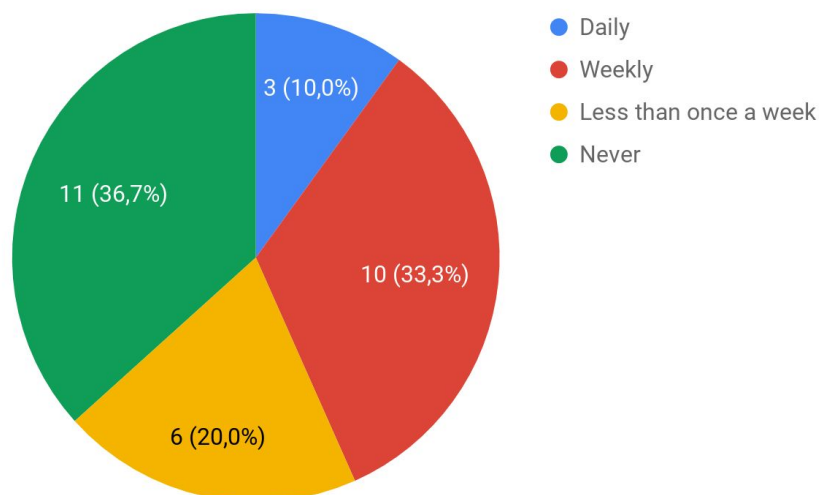
Figure 12. Students' frequency of using VR-based mobile apps with VR headsets.



Finally, with regard to the fifth variable (MV 5: *How often do you use language learning mobile apps?*), only 3 students (10%) stated that they use language learning apps on

a daily basis, while 11 (36,7%) claimed that they've never used them before, 10 (33,3%) confirmed that they use them on a weekly basis and 6 (20%) less than once a week (Figure 13).

Figure 13. Students' frequency of use of language learning mobile apps.



Furthermore, since the study aimed to gather students' feedback on two different apps, participants were divided into two groups each of which was made of 15 students. One group was asked to test the app *ImmerseMe* and the other group was asked to test the app *VR Education and Learning 360*. One of the main differences between both apps was that while *ImmerseMe* could not be tested with VR headsets (since at the moment the app does not allow its use) *VR Education and Learning 360* was tested using the VR headsets Google Cardboard.

In the case of *ImmerseMe*, the students have tried a free demo version with limited content² focusing on the learning and practising of the English language. There have been 15 participants from each educational stage: 5 A level primary students have tried the Beginner level, 5 B level secondary students have tried the Intermediate level and 5 C level university students have tried the Advanced level.

In the case of *VR Education and Learning 360*, all students were asked to try all twelve settings, taking into account that the videos of each setting were very short and thus would not take learners more than two or three minutes to watch them. Moreover, since the

² To get access to all the contents provided it is necessary to purchase a subscription.

content is not divided into different levels depending on the student’s proficiency in the English language, all student participants, regardless of their educational stage and level, tried exactly the same settings.

5.2.3 Students’ evaluation of the learning experience

To find out the opinion of student participants in terms of usability, usefulness, attitude towards using, intention to use, playfulness and anxiety, we asked students to fill in the TAM-based questionnaire once they had tested their respective app (*ImmerseMe* or *VR Education and Learning 360*).

Regarding the first aspect (PEU= Perceived Ease of Use) all students affirmed that *ImmerseMe* was between “easy” (9 students, 60%) and “very easy” (6 students, 40%) to use (PEU 1) (Figure 14). Moreover, all students confirmed that they became used to the app’s handling between “fast” (9 students, 60%) and “very fast” (6 students, 40%) (PEU 2) (Figure 15). With regard to those who tested *VR Education and Learning 360*, results are very similar and thus again all students confirmed that the app was between “very easy” (10 students, 83%) and “easy” (5 students, 33%) to use (PEU 1) (Figure 14). In addition, learners stated that getting used to the apps’ handling was between “very fast” (10 students, 83%) and “fast” (5 students, 33 %) (PEU 2) (Figure 15).

Figure 14. Students’ evaluation regarding the Perceived Ease of Use (PEU 1).

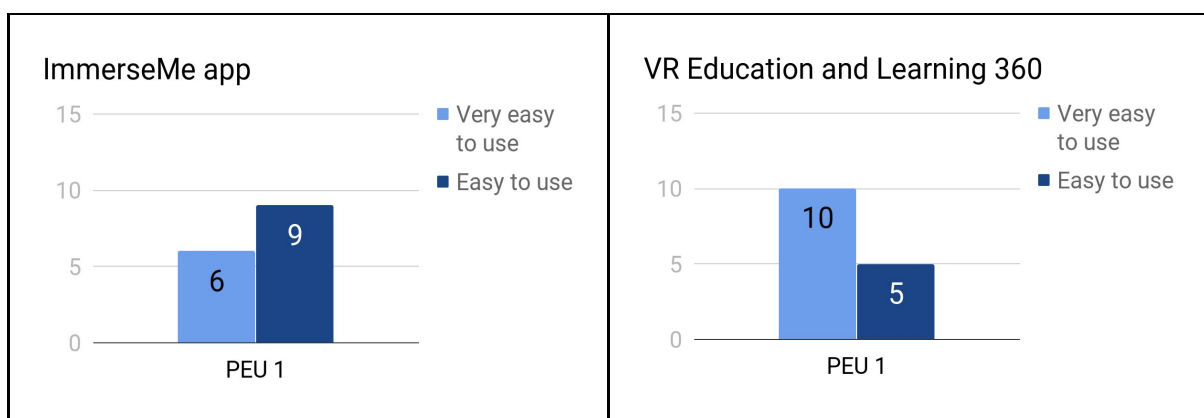
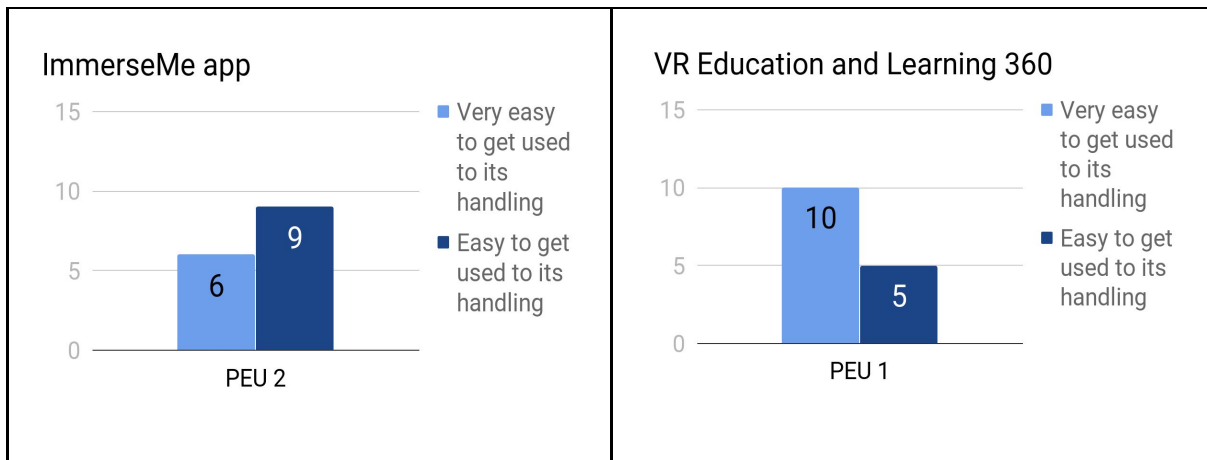


Figure 15. Students' evaluation regarding the Perceived Ease of Use (PEU 2).



When students were asked to evaluate the usefulness (PU= Perceived Usefulness) of their respective app for learning English, the students who tried *ImmerseMe* considered it “helpful” (13 students, 87%) or “very helpful” (2 students, 13%) for learning vocabulary (PU 1) and 15 out of 15 (100%) stated that the app helped them “very much” to improve their oral comprehension skills (PU 2) (Figure 16). From the group of students who tried *VR Education and Learning 360*, 10 students (67%) affirmed that the app was “very helpful” and 5 (33%) stated that it was “helpful” to learn vocabulary (PU 1) (Figure 16). Furthermore, the students stated that the app was “very useful” (11 students, 73%) or “useful” (4 students, 27%) to improve their oral comprehension skills (PU 2) (Figure 17).

Figure 16. Students' evaluation regarding the Perceived Usefulness (PU 1).

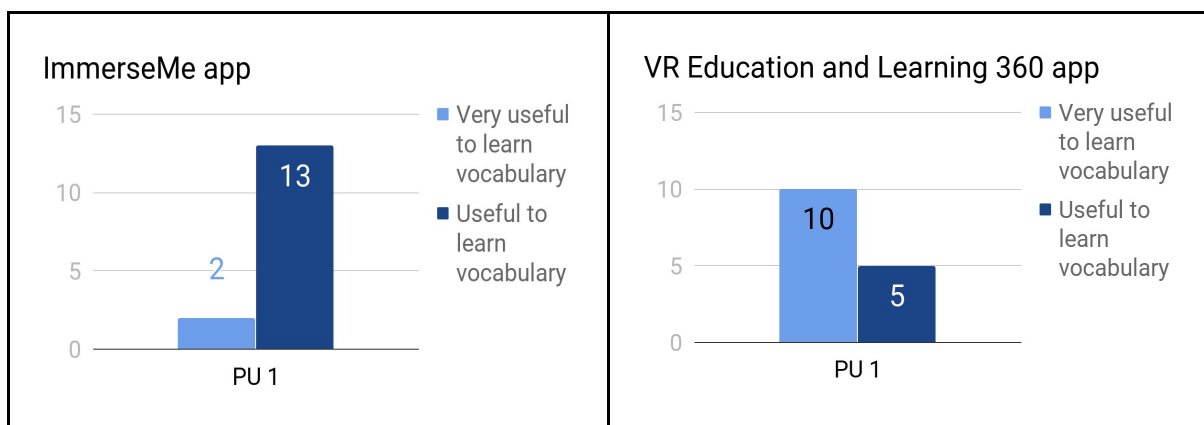
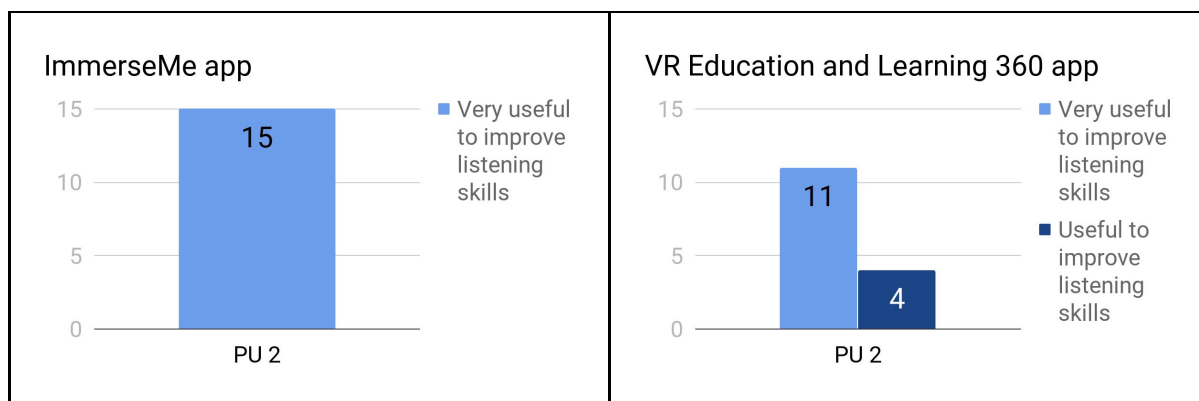
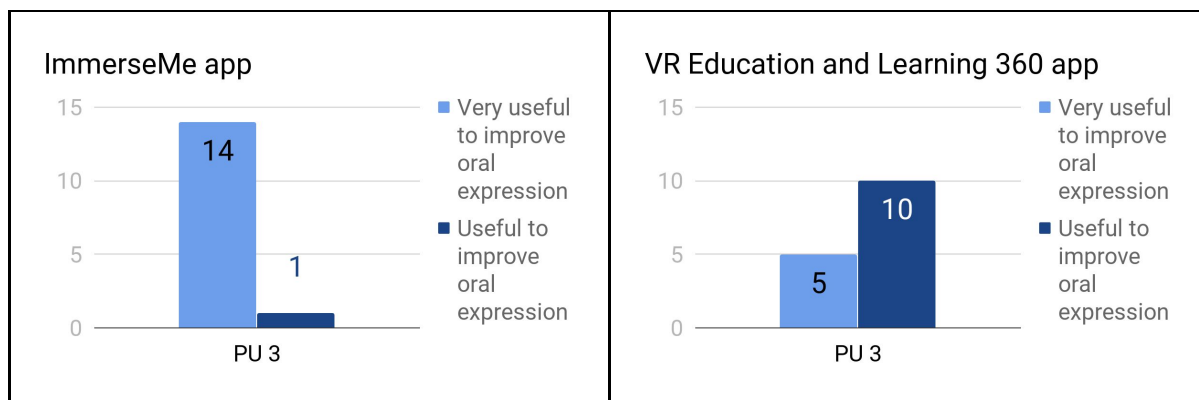


Figure 17. Students' evaluation regarding the Perceived Usefulness (PU 2).



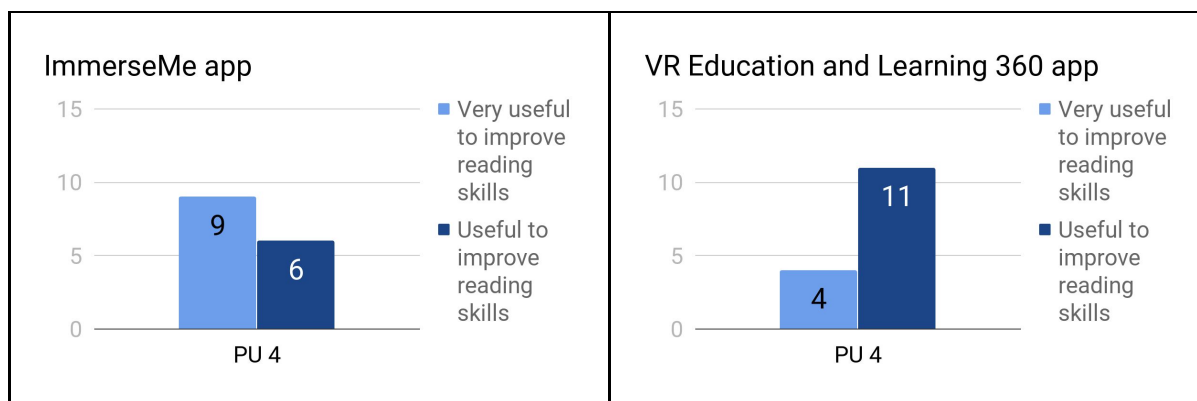
Apart from considering the apps useful for learning vocabulary and to improve oral comprehension, the students who tried *ImmerseMe* found the app “very useful” (14 students, 93%) or “useful” (1 student, 7%) to enhance oral expression (PU 3). The group that tried *VR Education and Learning 360* found the app “useful” (10 students, 67%) or “very useful” (5 students, 33%) to enhance oral expression (PU 3) (Figure 18).

Figure 18. Students' evaluation regarding the Perceived Usefulness (PU 3).



With regard to reading skills, the students confirmed that *ImmerseMe* was between “very useful” (9 students, 60%) and “useful” (6 students, 40%) to improve reading skills (PU 4). The students who tested *VR Education and Learning 360* scored it between “useful” (11 students, 73 %) and “very useful” (4 students, 27 %) to improve reading skills (PU 4) (Figure 19).

Figure 19. Students' evaluation regarding the Perceived Usefulness (PU 4).



Furthermore, students affirmed that *ImmerseMe* encouraged them to improve their pronunciation and fluency (PU 5) between “very much” (13 students, 87%) or “much” (2 students, 13%) (Figure 20). Additionally, 14 out of 15 (93%) “strongly agreed” that it encourages them to express themselves more accurately (PU 6). Only 1 student (7%) did not feel encouraged to improve the self expression (PU 6) (Figure 21). Moreover, 14 out of 15 (93%) confirmed that the app encourages them “very much” (12 students, 80%) or “much” (2 students, 13%) to pronounce better while 1 student (7%) was not sure if the app encouraged a more accurate pronunciation (PU 7) (Figure 22). In the case of *VR Education and Learning 360*, only 7 out of 15 (47%) that the app “helped” them to improve their pronunciation and fluency (PU 5), the rest stated that it was “not very helpful” (5 students, 33%) or “not helpful at all” (3 students, 20%) (Figure 20). Moreover, students stated that it encouraged them between “much” (7 students, 47%) and “very much” (2 students, 13%) to express themselves better (PU 6), while other 6 (33%) did not feel encouraged (Figure 21). In addition, only 7 out of 15 (47%) stated that the app encouraged them between “much” (5 students, 33%) and “very much” (2 students, 13%) to pronounce better (PU 7), the rest “did not feel encouraged” (3 students, 20%) or “did not feel encouraged at all” (5 students, 33%) (Figure 22). These results were expected, because the app *VR Education and Learning 360* focuses on vocabulary learning and the improvement of reading and especially listening skills, while *ImmerseMe* is focused on reading, listening and speaking skills.

Figure 20. Students' evaluation regarding the Perceived Usefulness (PU 5).

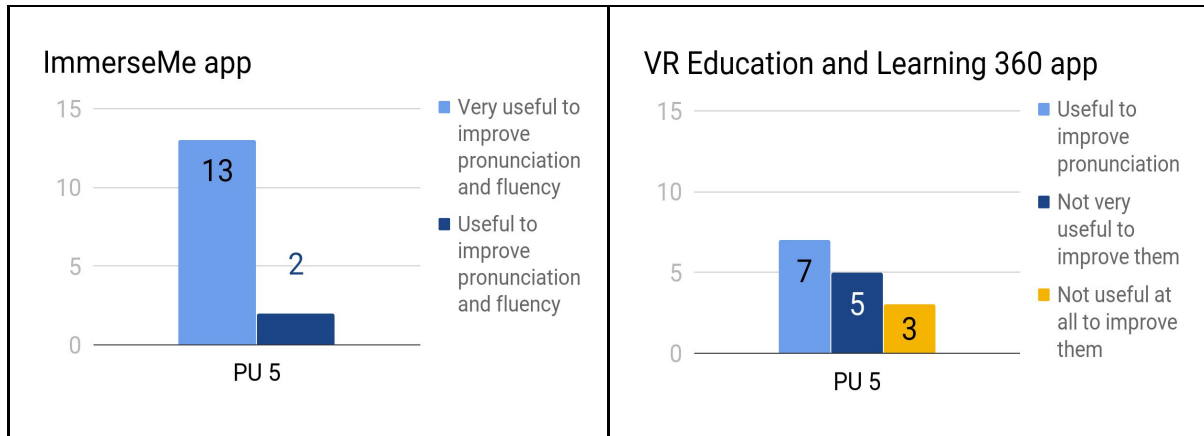


Figure 21. Students' evaluation regarding the Perceived Usefulness (PU 6).

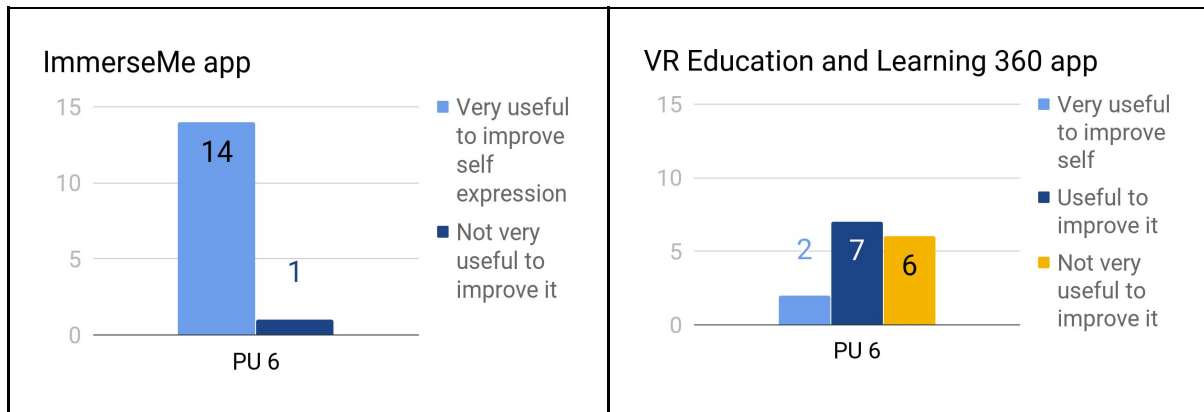
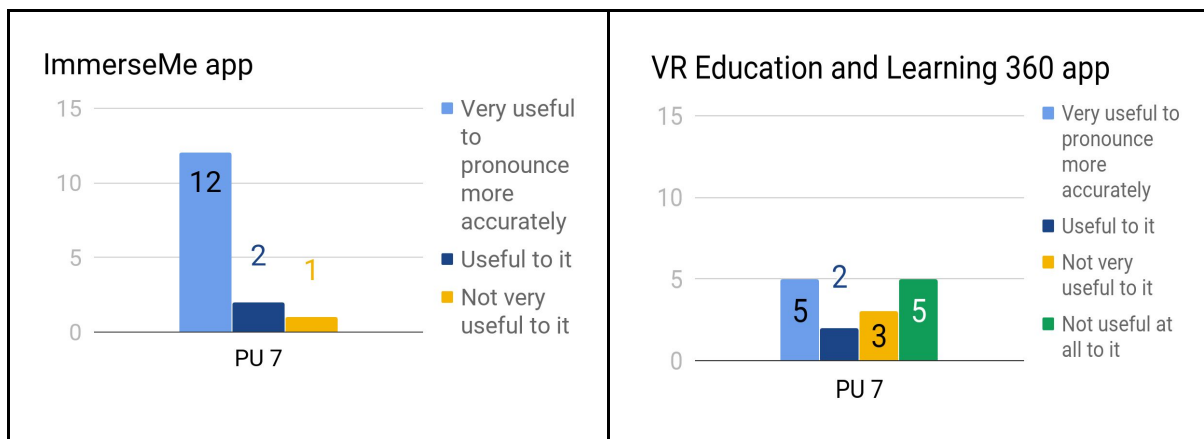


Figure 22. Students' evaluation regarding the Perceived Usefulness (PU 7).



Additionally, 14 out of 15 students (93%) considered that *ImmerseMe* allows them to learn “very much” (12 students, 80%) or “much” (2 students, 13%) about the cultural

background of the language (PU 8) (Figure 23). Moreover the students affirmed that this app enables them to learn the language within a context (PU 9) between “very much” (13 students, 87%) and “much” (2 students, 13%) (Figure 24). Only 1 student (7%) considered that the app did not allow him to acquire knowledge from the language’s culture. In the case of *VR Education and Learning 360*, only 1 from 15 students (7%) considered that it permits to acquire knowledge about the cultural background of the language (PU 8) the rest “strongly disagreed” (10 students, 67%) or “disagreed” (4 students, 27%) (Figure 23). Furthermore, students confirmed that it allowed them to learn language in context between “very much” (13 students, 87%) and “much” (2 students, 13%) (PU 9) (Figure 24).

Figure 23. Students’ evaluation regarding the Perceived Usefulness (PU 8).

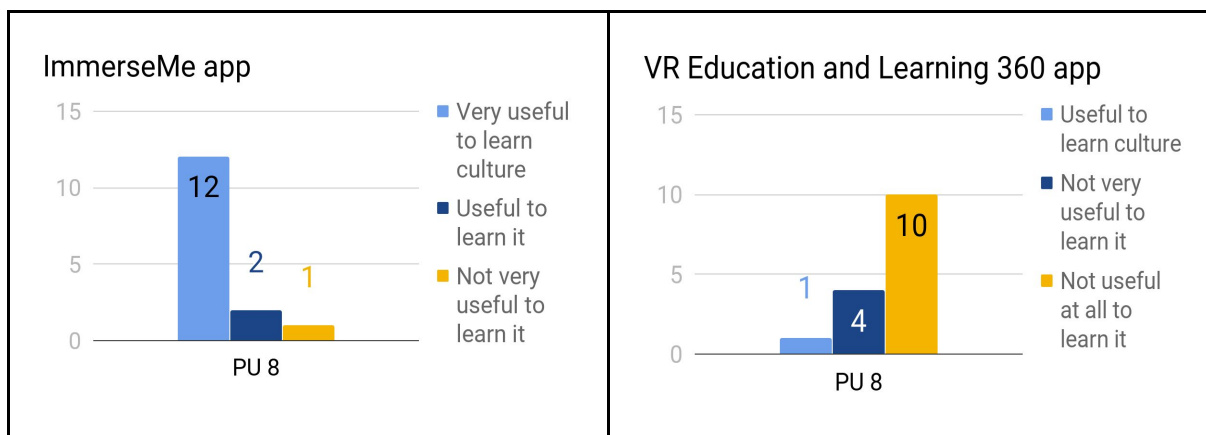
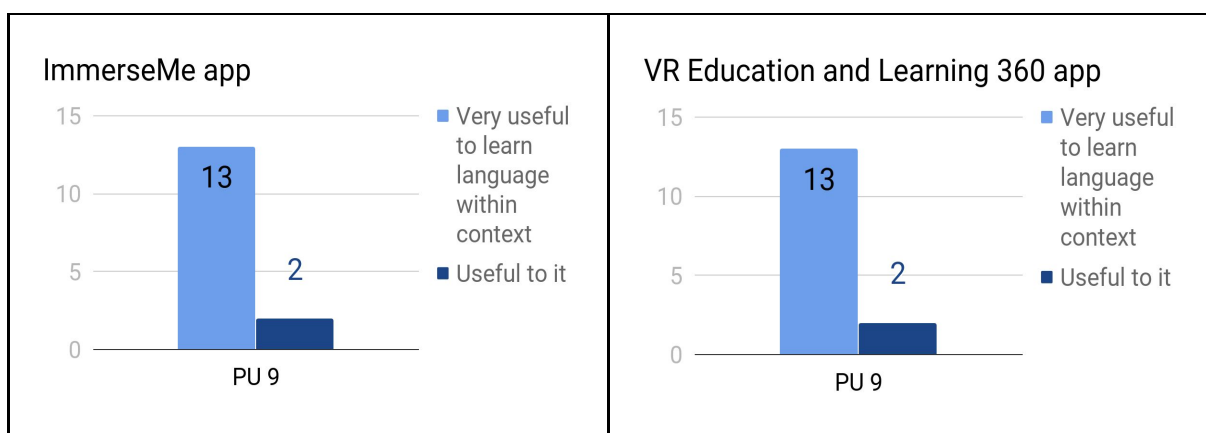


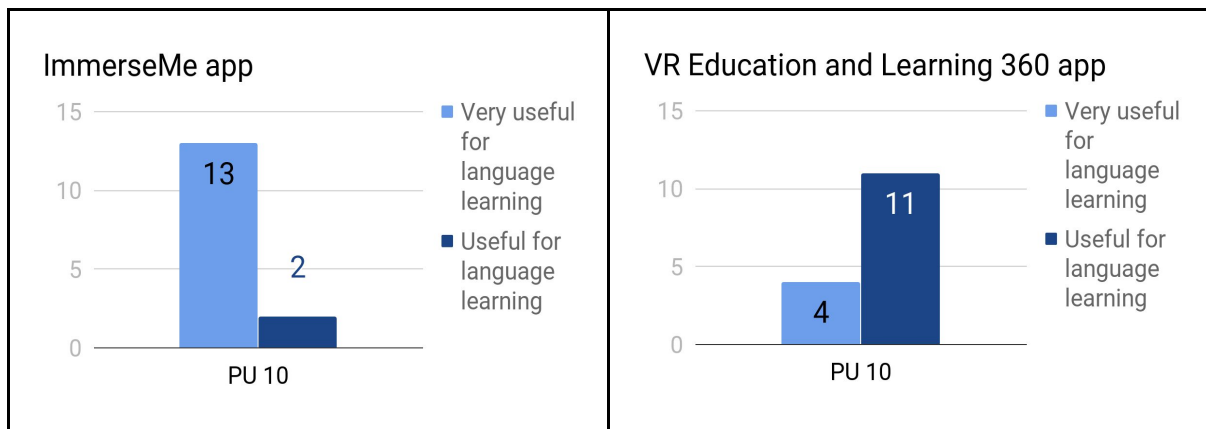
Figure 24. Students’ evaluation regarding the Perceived Usefulness (PU 9).



These results are due to the fact that *ImmerseMe* offers different learning settings in different contexts, many of them related to the culture of the language being learned, while *VR Education and Learning 360* allows learning the language in different situations and

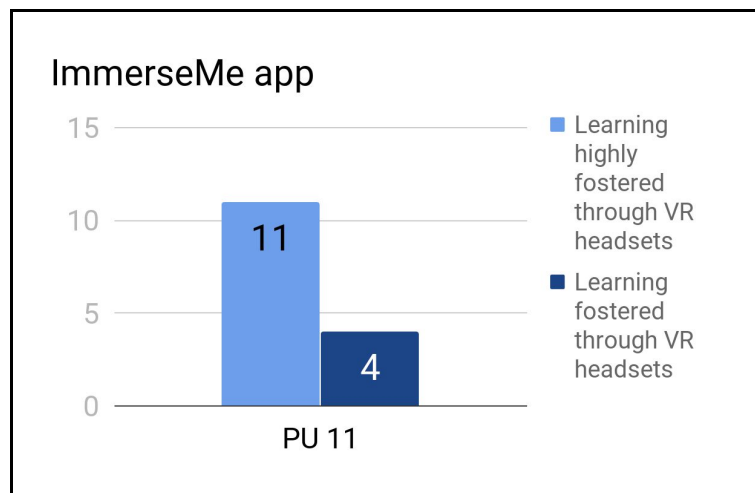
settings, but does not show characteristic cultural elements of the language learned, in this case English. The students who used *ImmerseMe* scored the app between “very useful” (13 students, 87%) and “useful” (2 students, 13%) for their language learning in general (PU 10). Although students’ overall evaluation in terms of usefulness was similar in the case of both apps, *ImmerseMe* got a better scoring compared to the *VR Education and Learning 360* app. And thus in the case of the latter, there were only 4 students (27%) who considered the app “very useful”, followed by 11 students (73%) who considered the app “useful” for their language learning (PU 10) (Figure 25).

Figure 25. Students’ evaluation regarding the Perceived Usefulness (PU 10).



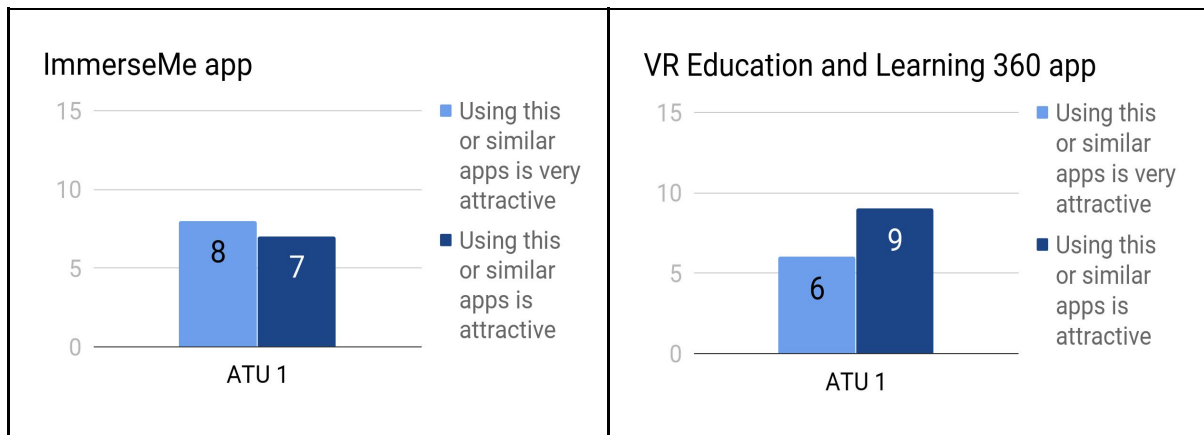
Interestingly, students stated that if the *ImmerseMe* app could be used in smartphones with VR headsets, it would foster their language learning between “very much” (11 students, 73%) and “much” 4 students (27%) (PU 11) (Figure 26).

Figure 26. Students’ evaluation regarding the Perceived Usefulness (PU 11).



Later, students were asked for their attitude towards the app they have tested (ATU= Attitude Towards Using). Participants affirmed that they like the idea of using *ImmerseMe* and similar apps for their language learning between “very much” (8 students, 53%) and “much” (7 students, 47%) (ATU 1). The participants who tried *VR Education and Learning 360* stated that they liked the idea of using this and similar apps for their language learning between “much” (9 students, 60%) and “very much” (6 students, 40%) (ATU 1) (Figure 27).

Figure 27. Students’ evaluation regarding the Attitude Towards Using (ATU 1) .



Moreover, participants agreed that apps like *ImmerseMe* increased their motivation towards learning “very much” (12 students, 80%) or “much” (3 students, 20%) (ATU 2) (Figure 28) and they stated that they would “strongly recommend” (11 students, 73%) or “recommend” (4 students, 27%) this kind of apps for learning languages (ATU 3) (Figure 29). The students that tested *VR Education and Learning 360* considered that this app increased their motivation towards learning between “much” (8 students, 53%) or “very much” (7 students, 47%) (ATU 2) (Figure 28). In addition, all of them affirmed that they would “recommend” (9 students, 60%) or “strongly recommend” (6 students, 40%) the app for language learning (ATU 3) (Figure 29).

Figure 28. Students' evaluation regarding the Attitude Towards Using (ATU 2) .

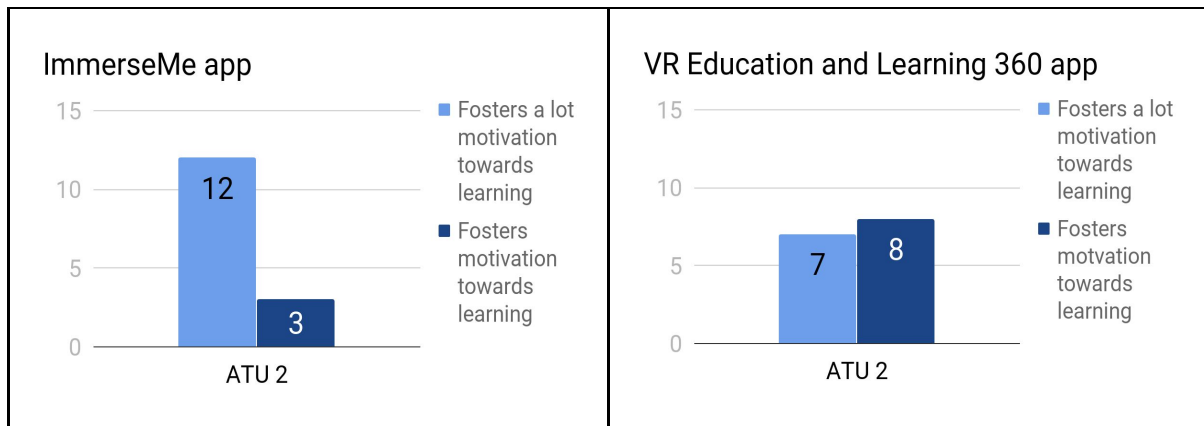
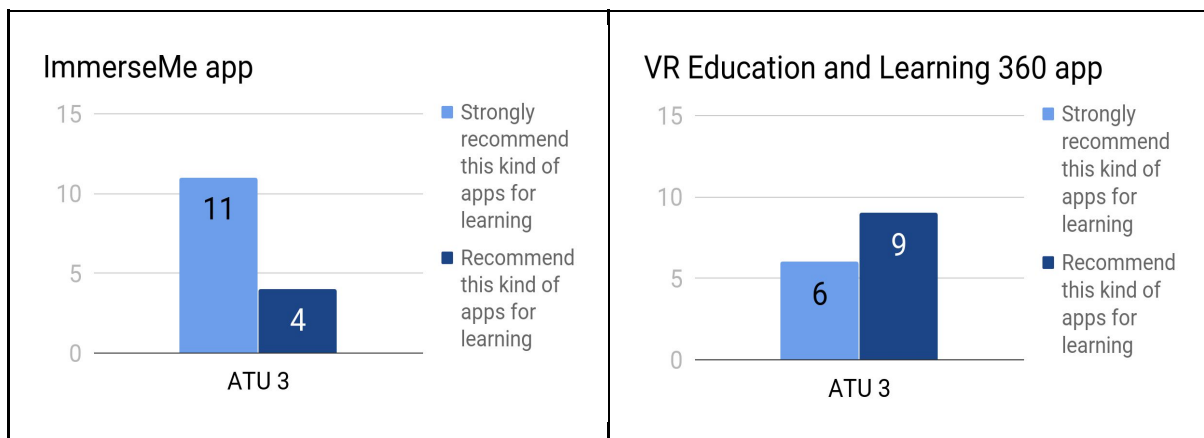
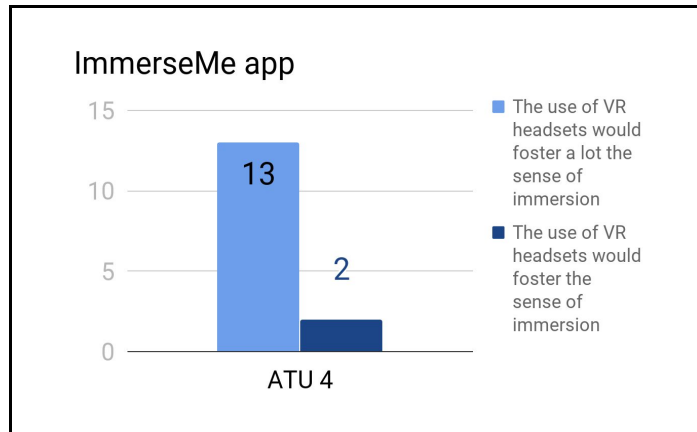


Figure 29. Students' evaluation regarding the Attitude Towards Using (ATU 3) .



Furthermore, the students that tried *ImmerseMe* “strongly agreed” (13 students, 87%) or “agreed” (2 students, 13%) that they would like it to be available to be used with VR headsets in smartphones to get a greater feeling of immersion (ATU 4) (Figure 30).

Figure 30. Students' evaluation regarding the Attitude Towards Using (ATU 4) .



When asking students on their intention to use both apps (BIU= Behavioural Intention to Use), 13 students “strongly agreed” (87%) and 2 students “agreed” (13%) on the fact that they would use the app *ImmerseMe* to learn other languages (BIU 1), while 9 students “agreed” (60%) and 6 (40%) “strongly agreed” on that they would use apps such as *VR Education and Learning 360* to learn other languages (BIU 1) (Figure 31). Furthermore, 15 out of 15 (100%) have confirmed that they would use the *ImmerseMe* app to support their language learning if it was available to be used with VR headsets (BIU 2) (Figure 32). It is a remarkable fact that all the participating students showed a positive attitude towards the use of both apps.

Figure 31. Students' evaluation regarding the Behavioural Intention to Use (BIU 1).

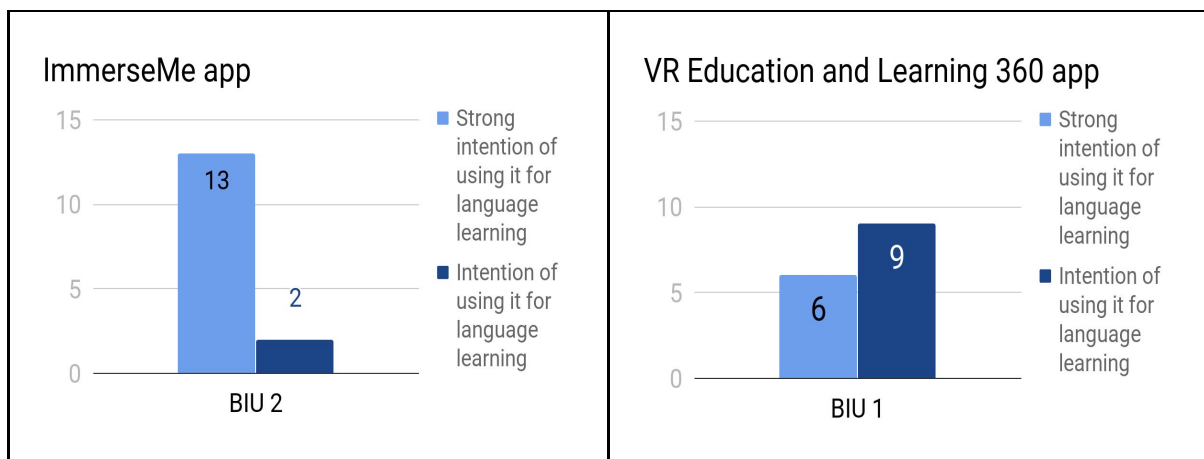
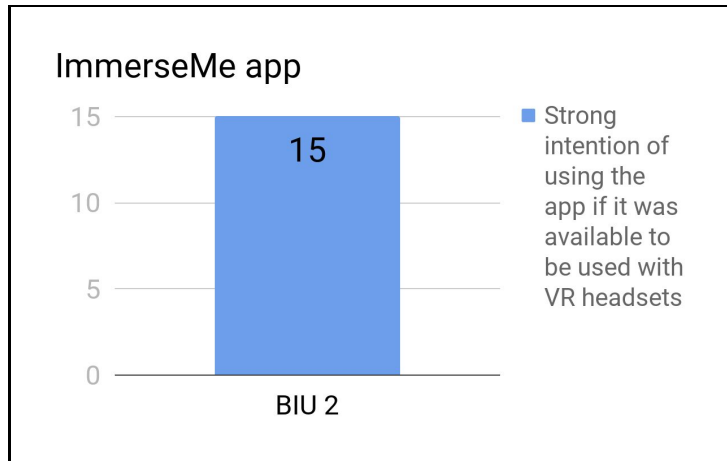
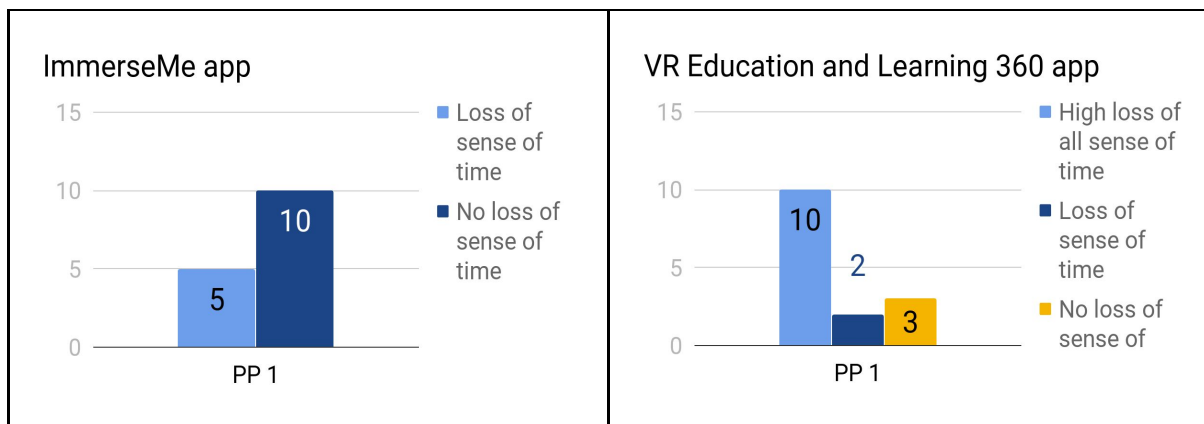


Figure 32. Students' evaluation regarding the Behavioural Intention to Use (BIU 2).



With regard to the perceived playfulness (PP= Perceived Playfulness), only 5 from 15 students (33%) considered that *ImmerseMe* made them lose all sense of time (PP 1), while 12 out of 15 (80%) scored the loss of all sense of time between “high” (10 students, 67%) and “very high” (2 students, 13%) in the case of *VR Education and Learning 360*. In addition, 10 students (67%) did not lose all sense of time while using *ImmerseMe* and only 3 (20%) did not lose it while using *VR Education and Learning 360*, because they were not used to using VR apps, neither VR headsets (Figure 33).

Figure 33. Students' evaluation regarding the Perceived Playfulness (PP 1).



Moreover, only 3 students (20%) felt that *ImmerseMe* managed to detach them from the real physical world (PP 2) (Figure 34). Nevertheless, 8 students (53%) felt as if they were actually part of the virtual world (PP 3) (Figure 35) even though that this app is not used with

VR headsets (which reduces considerably the sense of immersion), because of the lack of an avatar to represent the learner, the “real life” settings and the attractive and interactive way the content is presented. Interestingly, the students that affirmed to feel immersed were those who are used to playing video games and/or use virtual worlds. In the case of *VR Education and Learning 360*, 14 students felt between “detached” (9 students, 60%) and “very detached” (6 students, 40%) from the real world (PP 2) (Figure 34) and 15 (100%) stated that they felt between “immersed” (3 students, 20%) and “totally immersed” (12 students, 80%) in the virtual world (PP 3) (Figure 35).

Figure 34. Students’ evaluation regarding the Perceived Playfulness (PP 2).

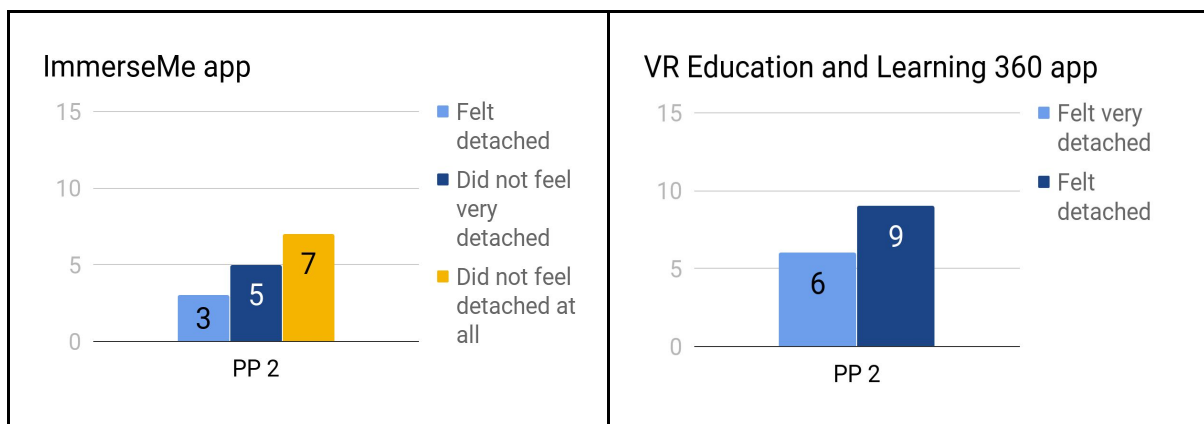
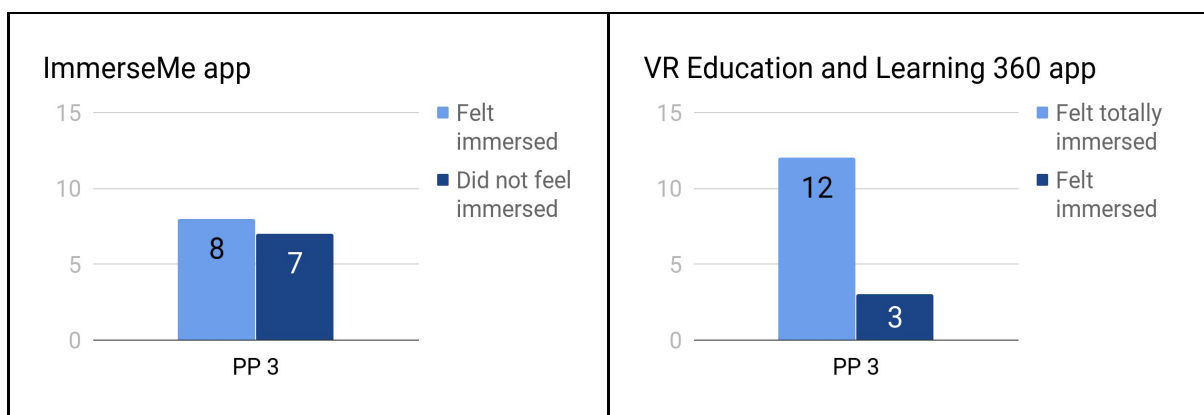


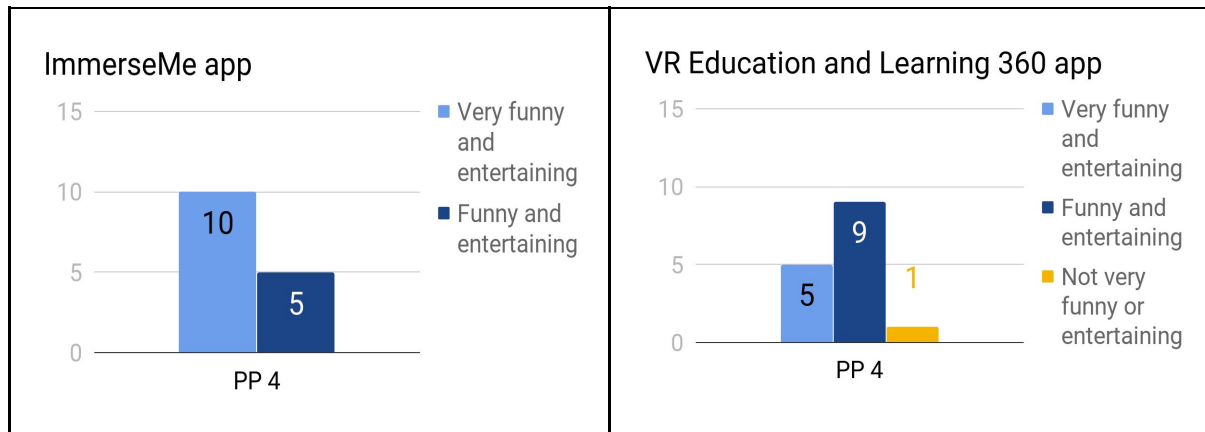
Figure 35. Students’ evaluation regarding the Perceived Playfulness (PP 3).



Moreover, the students’ answers suggest that the majority of them have really enjoyed learning with both apps. In the case of *ImmerseMe*, students stated that the learning

experience was between “very funny and entertaining” (10 students, 67%) and “funny and entertaining” (5 students, 33%) (PP 4). Those students who tested *VR Education and Learning 360* scored the learning experience between “funny and entertaining” (9 students, 60%) and “very funny and entertaining” (5 students, 33%) (PP 4). Only 1 student (7%) did not find this app engaging (Figure 36).

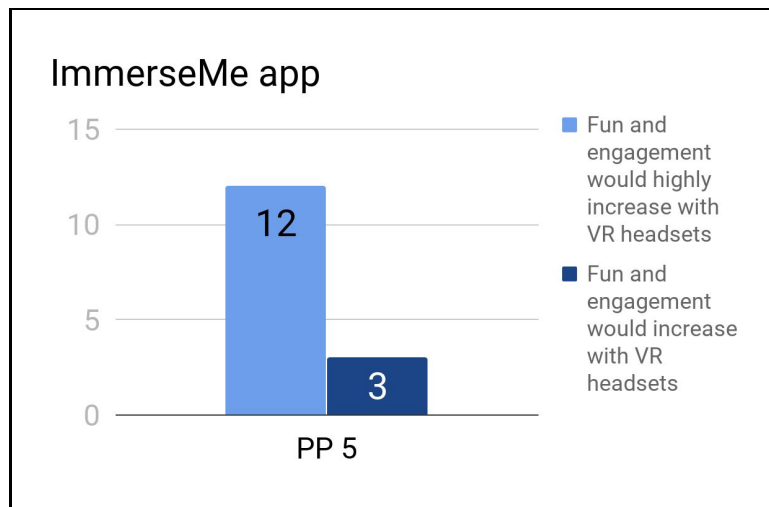
Figure 36. Students’ evaluation regarding the Perceived Playfulness (PP 4).



An interesting fact to note is that the students who strongly agreed that this app was funny and entertaining, that they would use it to learn other languages and that they would recommend its use were all primary A level students (except for one high school student). However, the rest of the students belonging to ESO and the University simply agreed with these statements and even 1 C level student disagreed with one of them. This suggests that the app is very useful and attractive for lower English level students (especially for A and B1 levels) but not so much for higher level students (from B2 onwards). The reasons why the participants generally rated higher their attitude towards using, their behavioral intention to use and the perceived playfulness on *ImmerseMe* app, is because it offers more languages to learn (9), a higher number of learning settings, it has different modes of learning and its content is divided and adapted according to student's proficiency on the target language. Moreover, the content and lessons are very engagingly presented. However, the app *VR Education and Learning 360* only consists of 12 very basic lessons at the moment, its content is not divided according to the student's proficiency in the target language and it only offers the learning of the English language.

Interestingly, all the students (100%) that tried the *ImmerseMe* app “strongly agreed” (12 students, 80%) or “agreed” (3 students, 20%) that if it could be used with VR headsets, the learning experience would be funnier and the sense of immersion greater (PP 5) (Figure 37).

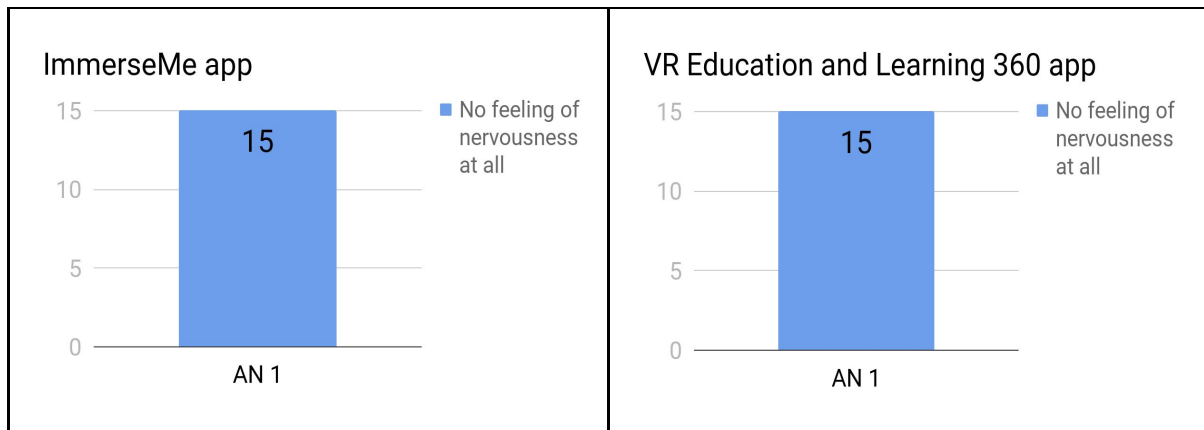
Figure 37. Students’ evaluation regarding the Perceived Playfulness (PP 5).



The significant difference that can be appreciated among the answers provided by the students on this section (PP) in both questionnaires, is due to the use of VR headsets. *VR Education and Learning 360* can be used with VR headsets, which fosters the loss of all sense of time and sense of detachment from the real world and the sense of immersion into the virtual one, while *ImmerseMe* cannot be used with VR headsets, limiting the immersive experience. Those students who often use video games, virtual worlds and language learning apps (daily or weekly), scored their motivation, intention to use the app and the perception of the app as funny and entertaining very high. In addition, they agreed that the app they tried was very easy to use and that getting used to its handling was very fast.

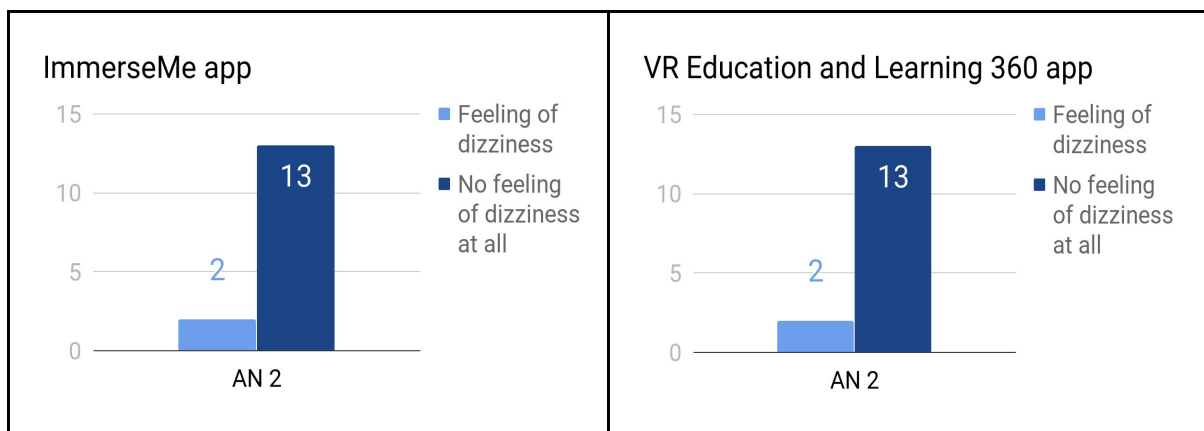
Finally, the possible anxiety derived from the use of VR apps (AN= Anxiety) has been analysed, with 15 students (100%) ensuring that they did not feel nervous because of the interaction with the app (AN 1) in both cases (Figure 38).

Figure 38. Students' evaluation regarding the Anxiety (AN 1).



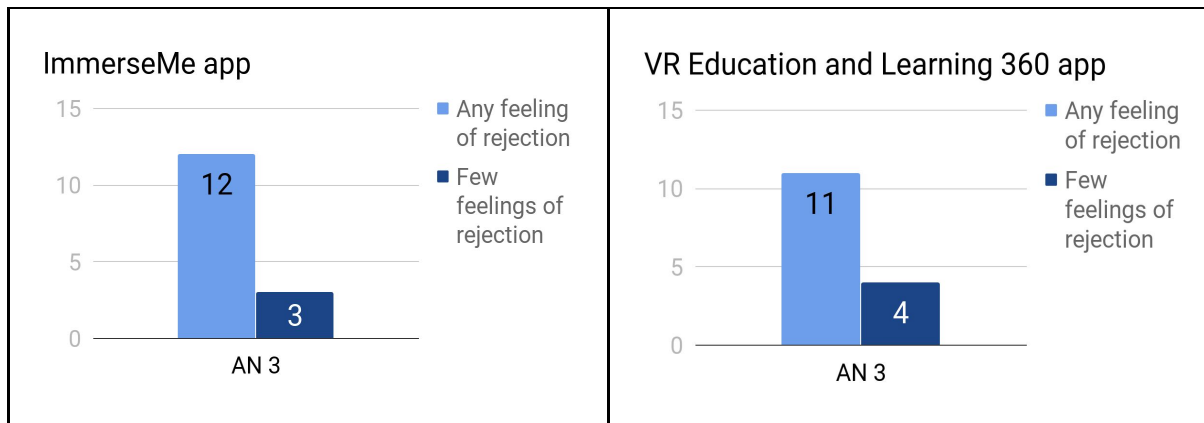
However, in both questionnaires 2 of the participants (13%) stated that they felt a little bit dizzy (AN 2) after using the app, while the rest (13 students, 87%) stated that they felt no dizzy (Figure 39).

Figure 39. Students' evaluation regarding the Anxiety (AN 2).



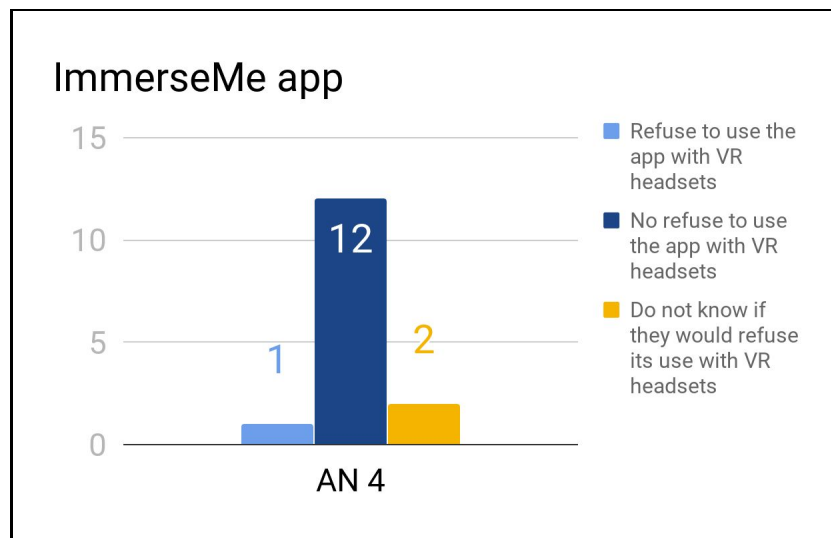
The people that reported to feel dizzy after using the apps were those who are not used to playing video games, neither to use language learning apps and in the case of *VR Education and Learning 360*, apart from the reasons provided before, students that felt dizzy have never used VR headsets. However, this feeling of dizziness seems not to be very severe or prevent the use of the app because in both questionnaires, the 15 participants have ensured that they have any (12 in the case of *ImmerseMe* (80%), 11 in the case of *VR Education and Learning 360* (73%)) or few (3 in the case of *ImmerseMe* (20%), 4 in the case of *VR Education and Learning 360* (27%)) feelings of rejection towards their use (AN 3) (Figure 40).

Figure 40. Students' evaluation regarding the Anxiety (AN 3).



A final question was posed to the 15 participants that tried *ImmerseMe*, in order to know if the feelings of nervousness and dizziness would make them refuse to use the app if it was available for VR headsets (AN 4). Only 1 student (7%) stated that he would reject its use and 2 students (13%) stated that they do not know if they would refuse to use it. The rest (12 students, 80%) affirmed that they would not refuse to use it (Figure 41).

Figure 41. Students' evaluation regarding the Anxiety (AN 4).



Apart from the questionnaire, an extra open question about the *ImmerseMe* app was posed: *Do you think that using ImmerseMe with VR headsets would help to increase your language learning? Why/ why not?* 9 students affirmed that its use would foster the sense of

immersion, 8 stated that language learning with VR headsets would be funnier, more entertaining and original, something different from what is usually done in class (mainly vocabulary and grammar exercises). This increases their motivation towards learning, a fact pointed by researchers such as (Kaplan Rakowski & Wojdyński, 2018). The possibility of practising in “real life” environments difficult or impossible to recreate in a classroom, was stressed by 4 students. 3 of them also highlighted the advantage of being able to practice in those realistic settings without feeling the pressure of being judged by a native speaker or fear of making mistakes, a fact pointed by researchers such as (Korkalainen et al., 2015). And thus researchers such as (Korkalainen et al., 2015) and (Kiili, 2005) state that this possibility of practising comfortably without the feeling of anxiety derived from committing mistakes “encourages the learning of new language skills and promotes the culture around the language itself” (Korkalainen et al., 2015, p.1). The results obtained suggest that the effect of novelty produced by the use of a new tool/approach stressed by researchers such as (Kennedy and Levy, 2009), together with the attractive and immersive way these kind of apps present language learning stressed by researchers such as (Berns et al., 2018) provokes a positive attitude towards learning and a greater feeling of immersion in the students, regardless their educational stage or English level.

6. RESULTS AND DISCUSSION

The results obtained reveal that the use of VR apps provide students with new tools for their language learning that are difficult to encounter in conventional learning environments and motivates them (especially if the app allows the use of VR headsets). Regarding the results obtained from the questionnaire it stands out that the students who tried *VR Education and Learning 360* scored higher percentages than those who tried *ImmerseMe* regarding the feeling of losing the sense of time (80%), the feeling of immersion (100%) and the sense of detachment from the real world (90%). This increased feeling of immersion was clearly related to the fact that the *VR Education and Learning 360* app allowed the use of VR headsets while *ImmerseMe* did not. Additionally, the students confirmed that if the *ImmerseMe* app was available to be used with VR headsets, it would foster an increased learning. Regarding the Perceived Usefulness (PU), the students “strongly agreed” (11 students, 73%) or “agreed” (4 students, 27%) on the fact that if the app could be used on smartphones and with VR headsets, it would foster their language learning (PU 11). With regards to the Attitude Towards Using (ATU) the app, students “strongly agreed” (13

students, 87%) or “agreed” (2 students, 13%) on the fact that they would like this app to be available for smartphones and to be used with VR headsets. According to the students interviewed, the use of VR headsets would help to increase the feeling of immersion (ATU 4). When asking students on their intention to use this app if it was available to be used with VR headsets, all of them (100%) confirmed that they would use it (BIU 2). In addition, in the section of Perceived Playfulness (PP) 12 students “strongly agreed” (80%) and 3 students “agreed” (20%) on the fact that if this app could be used with VR headsets, the learning experience would be more enjoyable and the sense of immersion greater (PP 5). Finally, only 1 student (7%) affirmed that he would reject this app if it required the use of VR headsets since he was afraid of feeling dizzy and/or nervous (AN 4). Another 2 students (13%) stated that they did not know if they would refuse to use the app with headsets if it provoked them such uncomfortable feelings. However, it is remarkable that 12 out of 15 students (80%) confirmed that they would not refuse to use the app if it required VR headsets.

With regards to motivation, 15 out of 15 students (100%) who tested the *VR Education and Learning 360* app confirmed that they felt between “motivated” (8 students, 53%) and “very motivated” (7 students, 47%) by the app. Those students who tried *ImmerseMe* “strongly agreed” (12 students, 80%) or “agreed” (3 students, 20%) on the fact that the app increased their motivation towards learning. Additionally, all student participants stated that they would recommend the app they tested because they consider it useful for language learning. Finally, for those students who tried *ImmerseMe*, there was an extra open question apart from the questionnaire: *Do you think that using ImmerseMe with VR headsets would help to increase your language learning? Why/ why not?* 8 out 15 students (53%) answered that they would feel more motivated towards learning using *ImmerseMe* with VR headsets because it would be funnier and more entertaining learning with it than with other more conventional methods. Moreover, 9 out of 15 students (60%) stated that the sense of immersion would be fostered using VR headsets, which would increase their engagement and learning. In addition, 4 students (27%) stressed out how beneficial was practising language in “real life” environments that are often difficult to recreate in conventional classroom settings and 3 of them (20%) highlighted the advantage of practising in those realistic settings without any fear of being judged for making mistakes.

These results allow us to appreciate that the use of VR technology and more specifically VR headsets provide an added value to language learning processes. VR technology offers teachers and students materials and tools that cannot be offered by any other teaching-learning method. This technology not only fosters learning, increases engagement and enhances the sense of immersion, but it also motivates students and makes learning more enjoyable and entertaining for them.

7. CONCLUSIONS

The present senior thesis aimed to explore firstly, the contributions and potential of VR technology to support foreign language learning and, secondly to find evidences in support or against our two initial hypotheses:

H1: VR technology provides novel opportunities to increase language immersion and to provide learners with “real world” scenarios.

H2: VR technology with headsets could increase students’ learning and motivation towards language learning.

After doing a review of the literature on the topic of foreign language learning through VR based apps, we first carried out a descriptive analysis of two VR apps (*ImmerseMe* and *VR Education and Learning 360*). Then we asked a group of 30 students to test the apps. This way we aimed to identify, on the one hand, the main characteristics and affordances of VR apps to increase language immersion and, on the other, to gather valuable feedback from the users themselves regarding the usefulness or not of VR technology to increase students’ learning and motivation. Both, the results from our descriptive analysis as well as the survey confirm our initial hypotheses.

On the one hand, the first hypothesis has been proven by the results from our descriptive analysis of both apps. The analysis allowed us to get an insight into the apps’ functioning as well as the tools they offer to support and improve the teaching-learning processes. We have verified that both apps provide teachers and learners with materials and

tools not offered by conventional methods. One of the most outstanding tools is the possibility of practising the target language in “real life” environments, offered by both apps. However, with regard to the aspect of immersion, the app *VR Education and learning 360* stands out, since it allows the user to employ VR headsets and thus to feel a greater sense of immersion, becoming part of the virtual environment itself. As previously stated by several authors (such as Cheng et al., 2017), the sense of being part increases students’ engagement and involvement, fostering an increased learning and performance.

On the other hand, the second hypothesis has been proven by the results obtained from the questionnaire. And thus, student participants showed a very positive attitude towards the use of VR technology and especially towards apps that allow the use of VR headsets. These answers reinforce what was stated in our two hypotheses, since they show firstly, that VR technology offers new learning opportunities that other more conventional tools do not offer (H1) and secondly, that VR technology motivates students (H2), due to the effect of novelty and the attractive, interactive and immersive way learning contents are presented.

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ANNEX: TAM-based questionnaire

Name: _____ **Surname:** _____

Level of Education (Primary, Secondary, University) and grade: _____

Nationality and Community: _____

Name of the app you tried: _____

Moderating Variables					
MV 1- Age					
MV 2- Gender					
¿How often do you use...?	Never	Less than once a week	Weekly	Daily	
MV 3- ...video games, virtual worlds					
MV 4-...virtual reality based mobile apps with VR headsets					
MV 5-...language learning mobile apps (Babbel, Duolingo, etc.)					
Perceived Ease of Use (PEU)	Strongly Disagree	Disagree	Agree	Strongly Agree	I do not know
PEU 1- The app is easy to use.					
PEU 2- Getting used to the app's handling is fast.					
Perceived Usefulness (PU)	Strongly Disagree	Disagree	Agree	Strongly Agree	I do not know
PU 1- The app helps to learn vocabulary.					
PU 2- The app helps to improve listening skills.					
PU 3- The app helps to improve speaking skills.					
PU 4- The app helps to improve reading skills.					

PU 5- The app helps to improve pronunciation and fluency.					
PU 6- The app encourages me to express myself more accurately.					
PU 7- The app encourages me to pronounce more accurately.					
PU 8- The app allows to learn about the cultural background of the language you are learning.					
PU 9- The app allows to learn a language in context.					
PU 10- In general, the app is useful to learn languages.					
PU 11- If the app was available to be used with VR headsets in smartphones it would help me for my language learning.*					
Attitude Toward Using (ATU)	Strongly Disagree	Disagree	Agree	Strongly Agree	I do not know
ATU 1- I like the idea of using this kind of app to learn languages.					
ATU 2- The app increases my motivation towards language learning.					
ATU 3- I would recommend this kind of app for learning languages.					
ATU 4- I would like this app to be available for smartphones and to be used with VR headsets to get a greater feeling of immersion.*					
Behavioural Intention to Use (BIU)	Strongly Disagree	Agree	Disagree	Strongly Agree	I do not know
BIU 1- I would use this app to learn other languages.					
BIU 2- I would use this app for my language learning if it could be used with VR headsets.*					
Perceived Playfulness (PP)	Strongly Disagree	Disagree	Agree	Strongly Agree	I do not know

PP1- The app makes me lose all sense of time.					
PP2-The app’s immersive experience manages to detach me from everything around me.					
PP3- The app’s immersive experience makes me feel as if I was actually part of the virtual environment.					
PP4- The app makes learning fun and entertaining.					
PP5- If the app could be used with VR headsets, the learning experience would be even more funny and the sense of immersion greater.*					
Anxiety (AN)	Strongly Disagree	Agree	Disagree	Strongly Agree	I do not know
AN1- The interaction with the app makes me feel nervous.					
AN2- The interaction with the app makes me feel dizzy.					
AN3- The interaction with the app generates in me feelings of rejection towards its use.					
AN4- If the app was available for VR headsets, the interaction with it would make me feel nervous and/or dizzy, generating feelings of rejection towards its use.*					
* = Questions only used for the questionnaire on <i>ImmerseMe</i> app.					

How much time have you spent trying the app? _____

How many learning settings have you tried in the app? _____

Do you think that using *ImmerseMe* with VR headsets would help to increase your language learning? Why/ why not?