Designing Immersive Language Learning Experiences: An Augmented Reality Approach for Young EFL Learners in Greece

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Abstract

Augmented Reality (AR) is becoming more and more popular among educators due to its potential to create immersive and engaging learning experiences. This paper explores the design of an AR-supported language learning activity tailored for young Greek learners of English as a Foreign Language (EFL). Based on Communicative Language Teaching (CLT) principles and Bloom's Taxonomy, the activity exploits AR affordances to address cognitive and affective factors critical to language acquisition, such as age-appropriate engagement, socioemotional learning, and the challenges of mixed-ability classrooms within the Greek socioeconomic context. During the AR activity learners are immersed in a narrative driven scenario so as to engage themselves with an AI-powered 3D friendly alien, who has visited Earth. Through this interaction, learners practice recently acquired vocabulary and they are given opportunities to develop receptive and productive English language skills. The design focuses on the promotion of learner autonomy, creativity and motivation, while also incorporating elements that cater for diverse learning needs. This study not only demonstrates the practical application of AR in EFL settings but also highlights its potential to bridge gaps in traditional language teaching methodologies. The paper discusses both the challenges encountered during the design process and proposes innovative follow-up tasks to extend the learning experience while offering actionable recommendations for educators seeking to adopt AR technologies in language learning contexts.

Keywords: augmented reality, English as a foreign language, young learners

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Introduction

In recent years, learning processes have been largely supported by the use of educational technology. Series of top-notch tools have been introduced to classrooms paving the way to more stimuli rich learning experiences. One of these technologies that is gaining momentum worldwide and reaches users in all levels of education, is Augmented Reality (AR), which enriches the real world with digital elements like images, texts or videos and makes the users believe that they actually exist. A definition that is commonly accepted, describes AR as an emerging technology that allows virtual objects to be superimposed to the real world (Azuma, 1997). When using AR, the users are fully aware of the place and the time they interact with the virtual elements. There is no need for clicking a mouse since the majority of AR applications run on mobile devices that allow flexibility and can be at hand wherever the user goes (Khoshnevisan & Le, 2018; Panagiotidis, 2021). AR has increased its popularity in the research community because it provides unique opportunities for interactivity and improved visualizations that other technologies fail to do so (Avila-Garzon et al., 2021). Research has also shown that AR has positive effects on students' motivation (Bacca et al., 2018), involvement in the learning process and learning outcomes (Akçayır & Akçayır, 2017). AR has also been proved an invaluable ally in foreign language teaching despite the fact that pertinent research is still in its infancy. Some frequently mentioned AR affordances focus on students' increased interest and participation (Akçayır & Akçayır, 2017; Binhomran & Altalhab, 2021; Tsai, 2020; Wen, 2021; Valero-Franco & Berns, 2024) and on the fact that AR enhances the authenticity of learning experiences and meaningful communication (Panagiotidis, 2021; Parmaxi & Demetriou, 2020; Punar Özçelİk et al., 2022) while promoting cultural awareness (Boboc et al., 2022; Chen et al., 2023; Liu et al., 2023; Papanastasiou et al., 2019). Additionally, there have been several studies highlighting its positive effects on learners' confidence and reduction of anxiety levels (Lin & Yu, 2023; Panagiotidis, 2021; Pegrum, 2021). Similarly, others have reported improved learning performance in a variety of language skills (Liao et al., 2024; Rintaningrum et al., 2024; Rozi et al., 2021; Shadiev, R.,2023; Tobar-Muñoz et al., 2017; Wedyan et al., 2022;), grammar and vocabulary acquisition (Husna et al., 2025; Idul & Syaiful, 2024; Schorr et al., 2024; Tran et al., 2024) as well as improved learning outcomes (Panagiotidis, 2021; Parmaxi & Demetriou, 2020; Punar Özçelİk et al., 2022). A smaller number of studies have successfully explored how AR supports embodied and active learning (Pegrum, 2021), caters for diverse learning styles (Alshumaimeri & Mazher, 2023) and contributes to the development of 21st century skills (Akçayır & Akçayır, 2017; Arpan & Nasution, 2024; Rafiq & Hashim, 2018).

An AR Learning Experience for Young Greek Learners of English at State Primary Schools

Educational Purpose

The objectives of this AR language learning experience are consistent with the present curricula of A1 CEFR level, while blending the sterile classroom environment with the digital content and immersing learners into an AR experience that motivates and stimulates them to practice language. In particular, by the end of the activity learners will be able to:

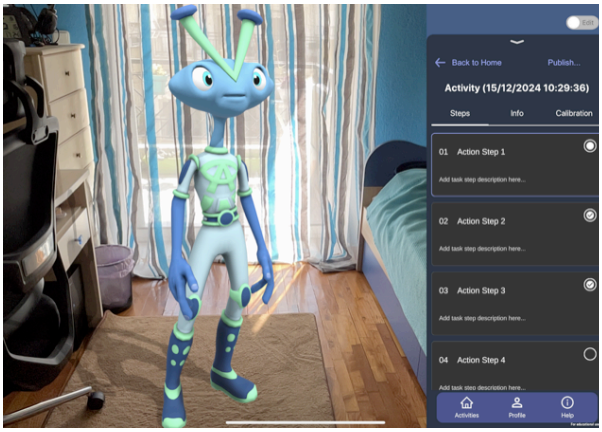
a) successfully identify and recall bedroom objects in English using pre-taught vocabulary,
b) develop listening and speaking skills by following audio instructions and interacting with the AI-powered 3D character,

c) make comparisons of rooms and objects using target vocabulary and simple structures in English,
d) work in pairs or in small groups and collaborate effectively for task completion,
e) familiarise themselves with AR tools and practice specific interaction methods like Tap and/or Pick and Match,
f) reflect on their learning through a series follow up activities that focus on creative writing or role-playing scenarios.

Design and Description of the AR Language Learning Experience

"There is an Alien in my bedroom" is an AR-supported language learning activity designed to last approximately 20' with the students either working in pairs or in small groups in class. During the AR language learning experience learners interact with the AI-powered 3D alien character, who has just arrived on Earth. They can ask him questions and receive answers thus improving understanding and participation. There is also a 3D object of a bedroom, audio messages and a picture with depictions of key vocabulary items in the form of a mini "picture dictionary." MirageXR was chosen among other AR authoring tools because it supports a variety of multimedia elements and due to its versatility in creating immersive learning experiences that enhance engagement, creativity and collaboration.

Figure 1
The AI-Powered 3D Alien Character



The AR language learning experience is designed to take place in class and it is divided into three stages:

Before the AR activity: Learners are briefly introduced to the storyline of the AR activity and to the main hero, the friendly alien, called Alfa. Next, learners form pairs or small groups and work together in order to make questions about the things they would like to ask Alfa, the AI-powered 3D alien character.

During the AR activity: Learners use the MirageXR app to navigate themselves through five task stations. Initially, they are assisted with the calibration and then they meet the AI-powered 3D alien character, who is ready to answer the questions learners have prepared for him. The second step includes the augmentation of a 3D bedroom from Sketchfab. There is also an audio message that informs learners that this is the alien's bedroom, while he stays on Earth and that they have to observe it closely and to write down on their notebooks as many bedroom objects as they know in English. There is no time limit and students can work at their own pace. In the next step, there is an audio recording that asks students to compare the

list of bedroom items they have just created to the picture they see. This picture provides immediate feedback to the students, as it acts as a mini "picture dictionary." It other words, it presents the vocabulary items in question along with an image to enhance the much-needed visual stimuli of objects required by young learners. Students can compare their notes to the mini "picture dictionary." Then they can correct any mistakes they might have made and add new items in their lists, if necessary. During the fourth step, learners are encouraged to help the little alien familiarize himself with the objects in his new bedroom as he does not know anything about them. This step involves the augmentation of the alien's 3D bedroom again, 3D arrows for the Pick and Match activity and audio messages with instructions as to where the learners should place the arrows in order to help the alien spot different bedroom objects. The structure of the instructions is very simple and straightforward to suit the proficiency level of the learners (A1 CEFR). For instance, "There is a bed near the desk" etc. Students practice their listening skills along with vocabulary related to bedroom objects and prepositions of place. At the same time, they get acquainted with AR specific interaction methods and they have to act relatively fast. In the final step, there is the augmentation of the alien character and an audio message asking students to compare orally their own bedroom to the Sketchfab 3D bedroom. The AI-powered 3D Alien character will be students' audience and assistant. This activity also serves as an exit/ evaluation activity, because students should use everything they have learnt/ revised so far.

After the AR language learning experience: This AR learning experience could only be the starting point of many other activities that can lead to further practice of all four skills in English. For instance, learners can write the diary of Alfa, the alien and describe how he spends his time in his new bedroom, thus practicing daily routines. Additionally, learners could swap roles with the Alien and become the visitors to his house. Then they could imagine, draw and finally talk about the Alien's bedroom in his planet. They can also be engaged in role-play scenarios so as to practice asking and answering about all the different objects in the alien's place. Moreover, new AR learning experiences can be organized having the Alien character as a main persona in different settings, in order to explore a variety of thematic vocabulary units. For example, the Alfa in a farm, in a forest or in a classroom can only be some ideas of future scenarios suitable for the interests of this age group.

Figure 2

The 3D Bedroom and the Mini "Picture Dictionary" of Step 3

Conceptual Framework

This AR-supported language learning experience follows the basic principles of Communicative Language Teaching (CLT) as defined by Doughty and Long (2008). Initially,

the activities are linked logically under a thematic unit based on a simple story line. There is a focus on meaning by supplying learners with a purpose to use grammar and vocabulary. Also, learning is promoted by doing. There are no lectures that would lead to abstract ideas as young learners are not able to focus on them. On the contrary, there are concrete examples, pictures and controlled practice activities (Steps 2, 3 and 4) that are followed by a freer task (Step 5), thus leaving more space for creativity, personal relevance, and experimentation with the language. The error corrective feedback, which is also crucial for the learners, is provided in a way that respects the affective filter of the learners and at the same time it follows the principles of CLT. The learners have to compare their own list to the one provided in a form of a mini "picture dictionary" and proceed to self-correction, a method that promotes learner autonomy and has additional value to vocabulary retention. Similarly, when the learners compare and contrast the two bedrooms in Step 5 there is no immediate feedback since at that stage there is emphasis on improving learners' fluency and not so much on their accuracy. Increasing a learner's self-esteem and reaching a level of self-efficacy boosts the levels of intrinsic motivation and the sense of self-fulfilment.

"There is an Alien in my bedroom" also aligns with the cognitive processes suggested by the revised Bloom's Taxonomy (Armstrong, 2022). At the beginning of the AR learning experience learners have to *Remember* useful vocabulary and retrieve all the previously related words they know. *Understanding* is achieved by comparing their vocabulary lists to the mini "picture dictionary" presented to them in Step 3. They *Apply* everything they have learnt so far by attempting the Pick and Match activity during which they have to listen carefully to the instructions given to them. Step 5, which is the most demanding of all, requires learners to *Analyse* and *Evaluate* the information they have about the two bedrooms (the alien's 3D bedroom and their own) in order to *Produce* (*Create*) a valid comparison and talk about it to the AI-powered 3D alien character.

The Implementation Process

For the implementation process the Analyse, Design, Develop, Implement and Evaluate (ADDIE) model was chosen as it has been favourably commented in recent literature related to designing AR interventions in the EFL context (Lazou & Tsinakos, 2022). More specifically, the analysis was directed towards the learners' background knowledge on the topic as well as on their needs for skills' development. Additionally, the affordances of MirageXR authoring tool along with the potentials of the learning environment to host an AR-supported language learning activity were also analysed extensively. The design involved the storyline conception of the AR-supported activity and the steps that learners would follow so as to achieved optimal learning outcomes. The multimedia elements were chosen and / or designed exclusively for the activity. Also, new prompts were written for the AI-powered 3D alien character. Additionally, alignment with the current school curricula and the learning outcomes was ensured. The development entailed the creation and / or curation of AR content, including audio messages with instructions, supplementary materials like the mini "picture dictionary" and the interactive tasks. The implementation involved a small-scale piloting by volunteers both students and teachers to identify potential challenges and points for improvement. The evaluation comprised of delving deeper into collecting feedback and drawing upon insight to further refine the activity for future implementations.

Moreover, further considerations were taken into account for the implementation process related to the specific context young Greek learners of English live and study. The Greek educational system seems to be giving great attention to English language learning. Although

English is taught from pre-primary level up to 3rd year of Senior High School, rarely do students achieve the same level of language proficiency. A question often asked and researched is about the reasons why some people learn a second or a foreign language more easily than others given the same opportunities (Gardner & Lambert, 1972). Undeniably all people can learn a foreign language. However, the rate, the ease and the proficiency level reached varies from learner to learner and this is due to a large number of factors divided into two broad categories: cognitive and affective (Mattheoudakis & Alexiou, 2009). The first category includes variables such as age, language aptitude, intelligence, socioeconomic status (SES), learning strategies, and learning or cognitive styles and the second one is related to personality factors. For instance, anxiety levels, risk-taking, motivation, self-esteem, empathy, inhibition (Brown, 1994). Therefore, the design of our AR learning experience was mainly influenced by the following factors:

a) The age factor: Young children, tend to acquire foreign languages differently than teenagers or adult learners. First of all, they have limited attention span and they lose interest very quickly unless the activity is very engaging. Secondly, young learners prefer concrete activities as their understanding derives mainly from what they see, touch, hear and interact with. Moreover, they are very curious and they show great enthusiasm when discovering things by themselves. In other words, their motivation is stronger when there is an element of surprise and they can physically move around in order to achieve their goals. Additionally, young learners are egocentric creatures, who thrive in activities that are related to themselves and to their daily habits. They are also meaning oriented, which makes them able to respond to meaning even if they do not understand every single word of what they read or listen to. Finally, they are not inhibited to imitate their teacher or their peers while learning and they are quite imaginative, which makes them exceptional story tellers. Above all, they need constant encouragement and approval from their teacher (Harmer, 2001).
b) Socio-economic status (SES) factors: research has shown that Greek young learners' social and economic background affects their progress in English language learning (Frangoudaki, 1985; Katsikas & Kavvadias, 2000; Mattheoudakis & Alexiou, 2009). It seems that learners of a higher SES have some more advantages than students of lower SES. The former group receives extra tuition either in the form of private lessons at home or in afternoon specialized schools of foreign languages. As a result, they progress faster in their language learning process and outperform students of the same age who do not have access to such privileges. The same research also indicates that due to their cultural capital learners of higher SES are more motivated and more positively disposed towards English language learning than students of lower SES. Students coming from a more affluent family background have realized that learning English is closely related to having better job opportunities and making more money. Therefore, providing in class a rich immersive language learning experience would be beneficial and equally motivational for all learners despite their socio-economic background.
c) Mixed-Ability Classes and Constraints: teaching English in Greek state primary schools is characterized by large mixed-ability classes and outdated materials. Classes often include learners with different learning styles, whose proficiency level ranges from A1 to B1 CEFR, making it difficult for a teacher to address all needs. Teachers in Greece, much likely to their colleagues worldwide, often strive to supplement their textbooks and limited resources with activities and online tools in order to meet inclusion and equity (Eloff, 2024). The vision of achieving Sustainable Development Goal 4: Quality Education (Kushnir & Nunes, 2022). requires materials and instructions that can be easily adapted to cater for the students' diverse needs, skills,

preferences and backgrounds (Tomlinson, 2022). Recent research (Ngo & Vo, 2025; Parmaxi et al., 2024) has shown that the variety of AR's multi-modal features can successfully accommodate different learning styles and provide opportunities for enhanced engagement and personalized learning thus promoting inclusivity.

Considerations / Limitations

There are certain anticipated problems mainly deriving from the age of the target group. Young learners might need more time to familiarize themselves with the application before being able to fully explore its potential. However, spending time in class and training students how to use the application could be a solution to the problem. Also, the availability of compatible devices could pose problems at the smooth running of the activity. Although MirageXR is compatible to a long list of devices, it is quite probable that schools might not have the suitable equipment. It is therefore, at the educators' disposal to check compatibility and/or provide other possible solutions for the AR activity. Additionally, strong and stable wi-fi connection is required as it can seriously affect the outcomes and the smooth running of any AR learning experiences. Unfortunately, not all classroom areas have access to reliable internet connection and for this reason alternative connectivity solutions should be available when introducing AR immersive experiences. Last but not least, educators should make sure that their classrooms are suitable for AR activities. Noisy, classrooms with limited light and space to move around are not ideal. For this reason, it is advisable to rearrange the desks and create more space, opt for quieter, less crowded rooms when possible. Another solution would be to consider using AR outdoors or in larger shared spaces like the school library or a multipurpose room.

Conclusion

Designing and developing AR learning experiences for young English language learners requires to take into account a range of cognitive and affective factors before making the final choices. Also, the principles of CLT and Bloom's taxonomy can provide a safe framework for all the educators who are interested in creating AR learning experiences that allow the learners to take control of their learning, to become autonomous, while practicing and revising vocabulary, skills and structures in English language. MirageXR is a free, powerful tool that can support the design of such AR learning experiences and it can also be integrated with many course materials.

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