

TEACHER PERCEPTIONS ON IMPLEMENTING MOBILE AUGMENTED REALITY FOR THE TEACHING OF ITALIAN AS A FOREIGN LANGUAGE. A PILOT STUDY.

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Abstract

Augmented Reality (AR) is an emergent technology that is revolutionizing the educational environment. Despite the plethora of advantages that AR has demonstrated in a number of disciplines, its implementation for foreign language education is still limited. Moreover, the majority of teachers are unfamiliar with this emergent technology and their role as AR designers and facilitators is still a critical factor. On the other hand, the most explored target languages are English and Chinese and although new languages are being investigated, the study of AR for the Teaching of Italian as a Foreign Language (TIFL) is limited. Therefore, the investigation aimed to highlight the perspective of educators when engaged in the process of designing and implementing Mobile AR (MAR) for the language classroom. In line with other researches, the pilot study showed that according to teachers' perceptions, AR has the potential to enhance student motivation. However, initial findings highlighted the need of long-term, ongoing training for teachers and the necessity for open-source, code free, mobile AR platforms specifically designed for language educators. Becoming equipped with skills and tools to integrate AR in the language classroom, teachers can customize this emergent technology, avoiding the situation where AR learning design is mainly managed by information technologists, that ignore students' needs and have a limited understanding of effective pedagogies.

Keywords

Augmented Reality, Mobile Assisted Language Learning, Teacher Perceptions, Italian Language, Metaverse

1. Introduction

As an emergent technology, Augmented Reality (AR) enables the integration of virtual layers into the real world (Azuma, 1997). By pointing the device camera to an object, the user is exposed to enhanced virtual contents like 3D pictures, audios, videos or animations. While VR completely immerses the user in a synthetic environment, AR supplements reality, rather than replacing it (Milgram et al., 1994; Kauffman, Papp, 2006). This specific characteristic of AR allowed it to be suitable for the classroom, especially when it is implemented through mobile devices like smartphones or tablets. Nowadays, mobile technologies are increasingly supporting formal foreign language education (Kukulska-Hulme, Morgana, 2021; Sun, Gao, 2020). Therefore, when implemented through mobile devices, AR “falls into the scope of MALL [Mobile Assisted Language Learning], which enables the continuity or spontaneity of access and interaction across various language teaching and learning contexts” (Zhang et al.,

2020: 218). Consequently, through Mobile AR (MAR) students can move around a physical space transformed in an interactive scenario, enabling learners to interact with an enhanced virtual input in a meaningful context.

Despite the plethora of advantages that AR has demonstrated in terms of engagement, interactivity and learning outcomes, a number of gaps still need to be addressed in order to fully understand how to successfully integrate this emergent technology in language teaching and learning (Bonner, Reinders, 2018; Lee, 2020). Therefore, the next paragraph will address the gaps that represent the rationale for the overall study, of which the piloting here presented is part of.

2. Literature review

2.1 AR for Mobile Assisted Language Learning

According to the 2020 Educause Horizon report, AR is one of the six emerging technologies and practices that are beginning to have a significant impact on the future of teaching and learning. AR enhances students' active interaction with the learning materials (Solak, Cakir, 2015) while positively affecting motivation (Chen et al., 2020; Taskiran, 2019). Moreover, it encourages out-of-class language use (Cervi-Wilson, Brick, 2018; Thorne et al., 2019), enabling learners to implement the target language in a spontaneous way (Zhang et al., 2020).

Nowadays, the ubiquity and the accessibility of MAR offers to teachers the opportunity to create linguistically and culturally authentic domains (Kessler, 2018). However, one of the major drawbacks in the literature is that "educators are predominantly unfamiliar with an emerging technology such as AR and it is unlikely to have learning gains" (Khoshnevisan, Le, 2019: 72). In many cases, teachers do not possess sufficient knowledge of the technology and they are not trained to deal with possible technical issues that could arise when AR is implemented in classroom (Parmaxi, Demetriou, 2020). Therefore, "instructors [...] should consider taking upon the dual role as a language teacher and AR technology designer so that they can better evaluate their students' needs and customize the technology in their teaching" (Zhang et al., 2020: 230). The lack of long-term, ongoing training for teachers is thus a fundamental issue, since it is crucial to support an effective integration of AR in classroom, as well as successful language learning outcomes.

In order to address this gap, the study implemented Action research, focusing on the perceptions of Italian as a Foreign Language (IFL) teachers in Argentina when designing and implementing MAR activities. Further gaps addressed in this study regards aspects such as the educational contexts where AR has been applied and the languages explored. There are still a number of issues to investigate in the field of AR for secondary level language education (Laine, 2018; Bonner, Reinders, 2018) and for this reason the sample of the present study has been selected in secondary schools. Regarding the target languages, English and Chinese are the most explored, and although less commonly taught languages are being investigated, the use of MAR for the TIFL is still very limited (Parmaxi, Demetriou 2020). To the date, only one empirical study has been conducted on Italian language (Cervi-Wilson, Brick, 2018).

2.2 Defining teacher perceptions

A theoretical exploration of the constructs of attitudes and beliefs is crucial to define teachers' perceptions (Eickelmann, Vennemann, 2017; Ertmer et al., 2012; Tondeur et al., 2017). Attitudes can be defined as individuals' positive or negative responses towards an object, a

condition or a situation, able to generate a tendency that will direct to a certain behavior (Campbell, 1963; Fazio, 1990). Together with attitudes, two teacher beliefs that are crucial for a definition of teacher perceptions on new technologies and of their behavioral intention to implement them are Perceived Usefulness (PU) and Perceived Ease of Use (PEU) (Davis 1989; Sun, Gao, 2020). PU refers to the degree to which the probability of implementing a specific technology will increase the overall job performance (Davis, 1989). Similarly to PU, PEU has a direct effect on teachers' acceptance of digital technologies, referring to the degree to which a person expects that implementing a certain computer software or system is going to be free of effort (Davis 1989).

External factors have to be considered as well. Digital literacy, lack of time availability to plan and design classroom instruction with new technologies, as well as the number of issues related to the availability of a solid technology-based infrastructure in schools (Pegrum, 2021) can influence technology adoption. Moreover, because of the social and economic nature of the context of this study, these issues are particularly relevant for the research. Other relevant constructs are teachers' anxiety and comfort, both adapted from the Computer Attitude Questionnaire (CAQ), since they have a strong impact on defining someone perception of a specific technology (Webb, Domain, 2019).

3. Methodology

3.1 Research aim and research questions

The study has a twofold purpose. On the one hand, the aim is to explore the perceptions of IFL teachers when engaged in the process of designing and implementing MAR. On the other hand, collaborating with teachers in order to implement AR as a pedagogical tool in the language classroom, the research aimed to contribute to a modification of certain instructional practices for the TIFL. Consequently, Action Research resulted to be the most appropriate methodological framework, because of its participatory and collaborative nature, as well as for its practical focus (Ivankova, 2015).

However, the researcher maintained a strong focus on the subjective perspectives of teachers involved. This decision derived from the need, broadly explained in the literature review, for studies on teacher perspectives, since “research on educational innovations suggests that technology integration can only be fully understood when teachers' pedagogical beliefs are taken into account” (Tondeur et al., 2016: 2). Therefore, within the transformative epistemological framework of Action Research (Ivankova, 2015) the researcher approached the study with a strong interpretative lens, by which participants insights and beliefs came to play a major role. Such an approach is reflected in the nature of the research questions that the study aims to answer:

RQ1). What are teacher attitudes towards Mobile Augmented Reality for the Teaching of Italian as a Foreign Language?

RQ2). How do teachers describe their experiences of designing MAR activities through an open-source tool?

RQ3). What do teachers perceive to be the main challenges and opportunities of MAR implementation for the TIFL?

3.2 Context of the study and participants

Argentina is chosen as the experimental context for this research study not only because of the historical and cultural reasons that link it to Italy, but also for the role that Italian language

teaching and learning plays in the country (Bagna, 2011; Patat, 2004). Therefore, the status of Italian language in Argentina and the backdrops from the literature are considered as valuable reasons to consider the Country a purposeful context for the study.

For the pilot study a total of thirteen IFL teachers working at the same secondary level school were invited to participate. They were contacted through their Italian language department coordinator that, in turn, was reached with the support of the Italian consulate. A total of 7 teachers decided to participate. All of them were women, 5 had been teaching for more than 15 years, while 2 of them were teaching from 2 to 5 years. Participants were all working with students from the first to the last year of secondary school and they were aged from 25 to 62. Among them, only one declared to know Augmented Reality at the time of the study and none of them had ever implemented AR or other emergent technologies in classroom before.

3.3 Research methods

Following the cyclical steps of observing, reflecting, planning, and acting of O'Leary (2004) model of Action Research, qualitative data have been collected for a semester (from July to November 2021) through semi-structured interviews. Observations should have been conducted, especially for the intermediate phase of the study when teachers were engaged in the process of designing the activities with a MAR computer platform (Metaverse). Due to the pandemic, it was not possible to organize meetings with teachers during this phase. Therefore, reflections related to this intermediate stage have been presented in the form of questions in the post implementation interviews. A total of 8 semi-structured interviews were conducted in two different moments of the study through the online platform of Google Meets, the average length was between 45 to 55 minutes, and they were video-recorded. The first interviews were realized at the beginning of the collaboration with teachers, while others were conducted after the implementation of MAR in classroom.

After sharing the overall research with teachers and presenting the open-source *Metaverse* platform for the creation of MAR contents, a plan has been arranged to design and implement the MAR activities in classroom, aligning them with the curriculum, as well as with students' and teachers' needs. Tutorials were created and sent to participants, so that they could start working on the MAR design at their own pace. After implementing the activities, data for this *action phase* were collected by post-implementation interviews. In order to guarantee reliability and validity of results, interview questions were discussed by a panel of experts that blind evaluated them according to the criteria of clarity, coherence, relevance and sufficiency elaborated by Escobar-Pérez and Martínez (2008). Interrater agreement was measured by Cohen's Kappa statistics. Results were statistically significant after the second evaluation of the judges and the correlation index was considered excellent ($k > .80$) according to the parameters of Hernández-Nieto (2011). Finally, interviews were transcribed and analyzed through a Reflexive Thematic Analysis approach (Braun, Clarke, 2021) with NVivo.

3.4 Ethical considerations

An informed consent form with a description of the study has been sent to all participants, that were also informed about the possibility to withdraw from the study at any time. In order to ensure confidentiality, all participants have been anonymized in interviews and findings.

4. Findings and discussion

Because of the practical limitations of this contribution, in this section only findings regarding the first RQ will be presented and discussed. Considering the recommendations of Resch and Enzenhofer (2018) on cross-language and multilingual data collection, as well as the nature of this journal, data extracts are maintained in Italian, the original language in which the interviews were conducted.

Following the six phases of Thematic Analysis by Braun and Clarke (2021), after the familiarization phase, the author started to code the data. Afterwards, initial themes were generated, developed and reviewed until the refined themes structure was reached. The two themes generated for the first interview are namely ‘MAR expected impact on students’ and ‘MAR expected impact on teaching’. The subthemes and codes for each one of the themes are presented and discussed below.

4.1 Theme 1: MAR expected impact on students

The first subtheme was named ‘Enhancement of motivation’ and shows how teachers expect MAR to enhance students’ motivation through three codes, that are namely ‘multimodality, interactivity’ and ‘gamified approach’. Teacher 2, for example, claimed:

“Beh, secondo me è assolutamente coinvolgente perché i ragazzi si trovano in una situazione completamente diversa da quella a cui normalmente sono abituati. Quindi credo che con un’attività di questo tipo, che è una novità, e loro veramente sono aperti alle novità, credo che i ragazzi la riceveranno molto bene e sarà molto stimolante, perché li allontana dal libro e dalle attività più comuni a scuola. Beh loro sono un po’ stanchi di questo, quindi se si può proporre qualcosa di innovativo sicuramente risulterà coinvolgente” (Teacher 2).

Moreover, teacher 4 said that MAR *“è più interattiva, molto simile ai giochi, a quello che loro sono abituati a fare. E tutte queste cose ai ragazzi piacciono e motivano, diciamo”* (Teacher 4). Therefore, according to teachers’ perspective, MAR can improve students active interaction with learning materials more than traditional teaching tools. These beliefs are in line with results from other studies, that demonstrated how learners studying with AR infused materials improved significantly in motivation, enjoyment and relationship with peers (Chen et al. 2020; Taskiran, 2019).

The second subtheme was coded as ‘Improvement of learning outcomes’ and it reveals teacher beliefs on the capability of MAR to promote autonomous and personalized learning, as well as content retention, as exemplified in the following excerpts:

“[Metaverse] permette questa questione dell’imparare diciamo autonomamente attraverso le... La voglia che loro hanno di farlo. Se per esempio guardando un video o facendo una lettura. Con questo possono imparare come vogliono” (Teacher 1).

Similarly, talking about the relation between a more traditional, frontal teaching pedagogy and the implementation of MAR, teacher 2 stated that:

“i ragazzi non è che imparano tutti nella stessa maniera, allora a seconda del tipo di apprendimento di ognuno uno può applicare una forma o l’altra, facendo così hai più modi per arrivare ai ragazzi e perché loro imparino veramente la lingua straniera” (Teacher 2).

An interesting aspect of this sub-theme relates to the perception that MAR improves learning through content retention. Teacher 3 said, indeed: *“Allora, credo sia utile come ti dicevo soprattutto per una seconda fase. Sì per la presentazione di un tema, ma soprattutto per fissazione, approfondimento, verifica dei contenuti”* (Teacher 3), while teacher 4 declared that:

“Io la userei come verifica di un argomento appena visto. Quindi far vedere prima l’argomento e usare questo per verificare se l’argomento è stato capito o no, per fissare. Per vedere se veramente hanno capito quello che hanno letto, che hanno visto, diciamo, attraverso video, immagini o lettura no?” (Teacher 4).

These teacher beliefs are in line with findings from other studies, that demonstrated the advantages of AR for long-term memory retention (Radu, 2014) and for memorization of contents (Campbell, 2016; Cipresso et al., 2018).

The last sub-theme identified in relation to the expected impact of MAR on students relates to the ‘Implementation of smartphones as pedagogical tools’. A number of studies demonstrated the advantages of this implementation for language teaching and learning (Godwin-Jones, 2017). However, the majority of them were on English as a foreign language (Lee, 2020). Therefore, the insights here presented are particularly valuable, since they focus on Italian language. Teacher 2 for example said:

“Bene il telefonino fino ad adesso è stato un nemico dell’insegnamento. Perché i ragazzi a scuola sono tutto il tempo con il telefonino e attirare la loro attenzione è difficile. Allora noi insegnanti che siamo abituati a lavorare in una forma più tradizionale dobbiamo sgridarli e via dicendo. Ora con questo tipo di strumento il telefonino da nemico diventa amico, perché tu quello che fai è dire ‘ragazzi prendete il telefonino che vi serve per imparare l’italiano’ (ride). Allora niente, diventa un amico, un collaboratore” (Teacher 2).

Teacher 4 claimed:

“tutte queste cose ai ragazzi piacciono. Già partendo dalla possibilità di usare il telefonino. Io per esempio ho visto George Clooney (ride). Allora pensavo, forse con i ragazzi si potrebbe fare mettendo personaggi vicini a loro, no? Già il fatto di usare il cellulare e avvicinarci al loro mondo credo che sarà accattivante per loro” (Teacher 4).

Another interesting aspect of this sub-theme concerns the fact that smartphones implementation is perceived as a student need from teacher perspective, especially after the Covid-19 pandemic. Teachers observed, for example: *“no, allora, cioè tra il cellulare e la mano non c’è niente (ride). Loro sono abituati, e ancor di più dopo la pandemia, ad usare il cellulare a scuola e per la scuola, cosa che non succedeva prima.”* (Teacher 4). Moreover:

“No per me è molto vantaggioso. Ci siamo resi conto che il telefonino a scuola serve e si deve permettere. Il punto è che dopo tutto l’anno scorso di pandemia il telefonino non è uno strumento, ma lo strumento” (Teacher 5).

The discussion on smartphones implementation is connected to the last code, named ‘Smartphone as a distractor’. According to teacher perception, the only disadvantage of MAR consists of the possible distraction that smartphones implementation could cause in classroom, as it can be seen in the following extracts: *“l’unico problema sarebbe la distrazione. Anche perché con venti, trenta ragazzi come fai a sapere se sono connessi o cosa stanno facendo?”*

(Teacher 4). *“Quello che sto pensando è che il rischio potrebbe essere quello di ricevere dei messaggi, cioè la distrazione, perché loro saranno con il cellulare, ma potrebbero non star facendo solo questo”* (Teacher 3). This code is particularly interesting because of the novelty of the phenomenon. The majority of studies focused on benefits of smartphones implementation in the language classroom, rather than on its challenges. Therefore, more research is needed in this regard, in order to better understand the main challenges that both students and practitioners need to address (Metruk, 2022).

4.1 Theme 2: MAR expected impact on teaching

While the first theme focused on teacher beliefs regarding their Perceived Usefulness of MAR in terms of student motivation and learning, the second theme that allowed to answer to the first RQ embraces all the issues that strictly relate to the teaching process. Therefore, it explored the dimensions of PEU, PU, Anxiety and Comfort. The two sub-themes identified were named respectively ‘Improvement of teaching’ and ‘Anxiety for lack of teacher training’.

Regarding the first subtheme, teachers underscored the idea that a main advantage of MAR could rely in its capability to close a sort of perceived gap between teachers and learners, enabling teachers to implement a more student-centered approach, as can be seen in the following answers to the question “How do you think that MAR could improve IFL teaching?”

“Sicuramente aggiunge qualcosa, dà più risorse. Soprattutto perché gli alunni sono cambiati allora siamo noi a dover adeguarci ad alunni diversi rispetto a dieci anni fa. Avvicinarci di più al loro mondo. Allora sarà difficile per alcune persone, alcune persone faranno più resistenza. Secondo me si tratta di un adeguarsi, adeguare il nostro ruolo come insegnanti, ricevendo più informazioni sul mondo attuale e sulla vita dei nostri alunni” (Teacher 3).

Moreover, teacher 5 and 6 explained that:

“Io credo che tutti in realtà quando ci troviamo di fronte a una cosa nuova abbiamo un po’ di timore, un po’ di ansia no? Però bisogna avere coraggio (ride) e oltrepassare quella frontiera perché altrimenti resti sempre nello stesso posto e non impari mai niente! Rimani a fare lezione nella stessa forma in cui lo facevi trenta anni fa quando i ragazzi erano completamente diversi” (Teacher 5).

“[...] quello che è importante è che loro riescano a vedere che possiamo uscire dal libro. Usciamo, anche in un modo semplice, e che possiamo anche fare grammatica volendo! (Ride) Però con un’altra visione, con un’altra risorsa. E se loro possono farlo con uno strumento così vicino, che è parte del loro corpo, lo vedranno anche come una cosa più simpatica e più naturale, che non è andiamo al libro, andiamo alla pagina!” (Teacher 6).

These observations are in line with studies that demonstrated the advantages of AR to promote student-centered learning and creativity (Diegmann et al., 2015). However, according to the author, this theme is particularly valuable in the context of the study, since it delivers a new perspective on MAR implementation, shedding more light on what it really means for a teacher to implement a new technology not only in relation the technology itself, but also to its pedagogical implications.

The second sub-themes is ‘Anxiety for lack of teacher training’ and it relates to the practical aspects of learning how to design MAR activities. According to teacher perceptions, MAR is expected to be easy to use and learn. However, teachers expressed some anxiety, mostly because of a professional trajectory characterized by a lack of training and support from their institution at the moment of implementing new technologies. Moreover, all teachers underlined the need to access online MAR design resources in languages other than English. All these

aspects are exemplified in the following extracts. Regarding the language issue, Teacher 1 explained that: *“mi è sembrata semplice, forse la cosa più difficile è quella di tradurre la pagina in spagnolo. Però poi per il resto no, perché mi è sembrata abbastanza intuitiva”* (Teacher 1). While Teacher 2 gave a detailed insight of a more than sixty years old teacher view on dealing with a new technology:

“Bene per me tutto quello che ha a che fare con le nuove tecnologie non risulta facile. Però mi appare come una sfida. Cioè non so, provo paura, mi sento impotente. Però c'è anche un desiderio di non voler rimanere indietro, questo è il futuro! E sebbene la pensione sia vicina (ride), vorrei continuare ad imparare queste cose. Io ora ho difficoltà a capire come funziona questa realtà aumentata, ma so che è questione di sedersi, provare e provare finché non si riesce a fare qualcosa. Poi la soddisfazione che si prova è molto grande! Mi piace, mi interessa, però...Pensa che quando io ero piccola la televisione era in bianco e nero (ride) e oggi sto pensando di utilizzare un telefonino per organizzare una lezione o una attività didattica! La distanza è molto grande! I cambiamenti che tutte le persone della mia età hanno sofferto sono molto grandi” (Teacher 2).

Again, this information is considered valuable in the context of the research, since it actually addresses the main gap of the literature and the rationale for the study. Only by identifying the main challenges that teachers encounter in the process of designing and implementing MAR, it will be possible to understand how to successfully integrate it in classroom (Zhang, 2020; Lee et al., 2020).

However, more research is needed in order to identify those challenges and issues in a number of social and cultural contexts (Parmaxi, Demetriou, 2020), as confirmed by the last two codes, that are namely ‘Lack of courses on new technologies’ and ‘Inappropriateness of courses’. These codes describe teacher needs in a context where economic and infrastructural resources can limit their education and training, as here exemplified:

“Ho fatto cose privatamente molto tempo fa. Mi piaceva tantissimo, sono stata una delle prime ad avere il computer a casa per esempio, quando avevano gli schermi tipo televisori, immagina no! La scuola ha offerto qualche volta, poche, pochissime volte corsi di informatica per imparare ad usare le funzioni basiche del computer. Ti dico agli inizi eh, quando è apparso il pacchetto office, il word, l'excel, poi dopo queste cose niente. Niente di niente di niente!” (Teacher 1).

“In questi due anni con la pandemia è stato veramente autoapprendimento. C'è stata collaborazione tra le insegnanti, la mia parallela mi ha aiutato, ma non è che dalla scuola per esempio ci hanno detto dobbiamo usare questa nuova piattaforma, Meet, e ci sarà qualcuno che ci aiuta ad usarla, no!” (Teacher 2).

5. Conclusion

The researcher implemented an Action Research study in order to address two main gaps in the literature of MAR implementation for foreign language teaching and learning. On the one hand, the need to work more with teachers in order to successfully implement AR in classroom. On the other, the importance to investigate languages other than English (Parmaxi, Demetriou, 2020). By addressing these issues, the study explored, analyzed and described IFL teacher perceptions on designing and implementing MAR activities through the Metaverse tool. During the pilot study, data were collected through online semi-structured interviews and analyzed with a Thematic Analysis approach (Braun, Clarke, 2021).

According to the findings for the first RQ here presented, IFL teachers in Argentina have positive attitudes towards MAR. This emergent technology is considered a valuable tool

to enhance student motivation, to improve contents retention and to promote learning through interactivity, multimodality and a gamified approach (Cipresso et al., 2018). Moreover, the implementation of smartphones for language learning is perceived to be an effective pedagogical tool not only to motivate students, but also to close a perceived gap between teachers and learners, promoting a student-centered pedagogy as well as autonomous learning (Diegmann et al., 2015). Furthermore, according to teacher perceptions MAR answers to students' need of implementing smartphones as learning tools, a necessity imposed by the Covid-19 pandemic. However, more research is needed in order to identify the challenges of implementing AR through smartphones, since mobile devices could consist of possible distractors (Metruk, 2022). Regarding MAR feasibility and learnability, teacher perceptions were positive, since they overall expected Metaverse to be easy to work with. However, educators expressed some anxiety regarding the design learning process, underling the lack of support from their institution and a need for teacher training.

Future directions should be aimed to an overcoming of economical and linguistical barriers, before implementing AR on a large-scale. More studies focusing on teachers' experiences of MAR design and implementation in specific contexts could contribute to a better understanding of teacher needs regarding this emergent technology. Only by identifying educators necessities it will be possible to enable them to customize MAR and to independently implement it in classroom. Moreover, the availability of online resources in languages other than English could support teachers worldwide in the process of learning to deal with MAR, especially in those contexts where resources to support teacher education are limited. Therefore, findings here discussed would benefit from more research in a variety of IFL teaching environments, since at the time of this paper, no other studies exists on IFL teacher perspectives as far as the author is concerned.

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