UNIVERSIDAD DE MURCIA

ESCUELA INTERNACIONAL DE DOCTORADO

TESIS DOCTORAL

Contextualizing Mobile Augmented Reality for the Italian Language Teaching and Learning. A Study on Teachers' Values and Purposes in Action.

Contextualización de la Realidad Aumentada Móvil para la Enseñanza y el Aprendizaje del Italiano. Un estudio sobre los Valores y los Própositos de docentes en acción.

D.ª Martina Manna

2024

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DE LA TESIS PRESENTADA PARA OBTENER EL TÍTULO DE DOCTOR
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doctorando del Programa de Doctorado en

Educación. Políticas, Prácticas y Evaluación en Contextos Formativos y Socioeducativos.

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Scuola Superiore di Dottorato

Dottorato di Ricerca in Linguistica Storica, Linguistica Educativa e Italianistica

Curriculum "Linguistica e didattica dell'italiano a stranieri"

XXXVI ciclo

TESI IN COTUTELA CON

UNIVERSIDAD DE MURCIA

Escuela Internacional de Doctorado

CONTEXTUALIZING MOBILE AUGMENTED REALITY FOR THE ITALIAN LANGUAGE TEACHING AND LEARNING. A STUDY ON TEACHERS' VALUES AND PURPOSES IN ACTION.

Settore scientifico disciplinare L-LIN/02 – Didattica delle lingue moderne

Tutor:

Prof.ssa Carla Bagna
Prof.ssa Isabel María Solano Fernández

Dottoranda: Martina Manna

Anno Accademico 2022-2023

When logic and proportion

Have fallen sloppy dead

And the White Knight is talking backwards

And the Red Queen's off with her head

Remember what the dormouse said

Feed your head

Feed your head

Jefferson Airplane

(White Rabbit)

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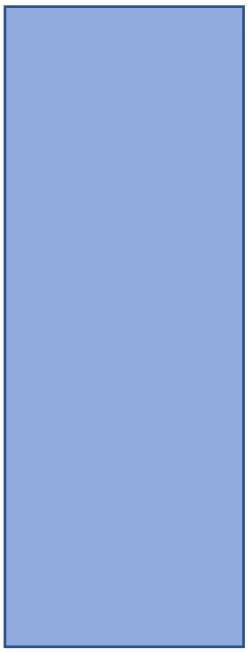

CONTEXTUALIZING MOBILE AUGMENTED REALITY FOR THE ITALIAN LANGUAGE TEACHING AND LEARNING. A STUDY ON TEACHERS' VALUES AND PURPOSES IN ACTION.

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Personal motivation for the research

The idea of this research study extends over time and space. Everything started in 2017 at Carleton University, Ottawa, in Canada, where I was working as an Italian language teacher at the department of applied linguistics. Once a month, the department used to organize a day of workshops for language teachers in order to let us discover new technologies that we could implement in our classrooms. It was during one of those workshops that I discovered Mobile Augmented Reality. However, when I tried to develop activities for my students, the platform was not very user friendly, it required some coding skills, the learning curve was quite large, and there were no open-source alternative platforms available for both iOS and Android devices at that time. I have therefore decided to surrender.

Two years later, I was teaching Italian in a bilingual secondary school in Rosario, Argentina. With my colleagues, we were preparing a year-end activity with our students on the life and work of the Italian poet Dante Alighieri. We wanted to do something different, motivating, with multimodal inputs, where students would have been engaged in a different manner than during the traditional frontal lessons. I remembered about Augmented Reality, and because 'never surrender' is the motto of my life, I talked about it to my colleagues and we decided to embark in this adventure. I will not tell now how good (or bad?) the journey was, but the advantages and disadvantages that we encountered made me reflect on a number of issues related to the actual possibility to implement emergent technologies in a number of contexts, like accessibility, infrastructures, teachers' time availability, economic and social issues and, of course, the digital divide.

Suddenly, the first Covid-19 pandemic stroke and it coincided with a time of my life where I felt the need to synthesize my experiences as an Italian language teacher around the world in something that would have made sense not only for me, but for future teachers as well. I wanted to tell the story of my journey as a teacher, with all its discoveries, with all those parts that no one ever told me during my studies. But I also wanted to understand more regarding some aspects I had only caught a glimpse. When I started to read articles on teacher education, on educational technologies, on the

implementation of educational technologies for language teaching, I discovered that the issues I wanted to focus on were actually there as ‘gaps in the literature’. The game was done then. The best decision would have been a PhD. What better way to deepen my intuitions and to tell the whole story than conducting a research?

Having a background in applied linguistics, I realized I needed guidance, contents, knowledge, skills and a whole apparatus of support for my thesis in the field of educational technologies. Therefore, I decided to conduct my study in a joint degree programme (co-tutela, in Italian), working at the same time under the applied linguistics department of the University for Foreigners of Siena, Italy, and the educational technology one of the Universidad de Murcia, Spain. I thought I was at the synthesis of my voyage as an Italian language teacher, but I did not know that my journey to Ithaca, which I will be telling you about in this entire work, had just begun.

Motivazioni personali per la ricerca

L'idea di questo studio di ricerca si estende nel tempo e nello spazio. Tutto è iniziato nel 2017 presso l'Università di Carleton, Ottawa, in Canada, dove lavoravo come insegnante di lingua italiana presso il dipartimento di linguistica applicata. Una volta al mese, il dipartimento organizzava una giornata di *workshop* per le e gli insegnanti di lingue, al fine di farci scoprire nuove tecnologie che avremmo potuto implementare nelle nostre aule. È stato durante uno di quei workshop che ho scoperto la Realtà Aumentata Mobile. Tuttavia, quando ho cercato di sviluppare un'attività per i miei studenti e le mie studentesse, la piattaforma non era molto *user-friendly*, richiedeva alcune competenze di codifica, la curva di apprendimento era piuttosto ampia e non c'erano altre piattaforme *open-source* disponibili tanto per dispositivi *iOS* che *Android* in quel momento. Ho quindi deciso di abbandonare la causa.

Due anni dopo, stavo insegnando italiano in una scuola secondaria bilingue a Rosario, in Argentina. Con le mie colleghe stavamo preparando un'attività di fine anno con i nostri studenti e le nostre studentesse sulla vita e l'opera di Dante Alighieri. Volevamo fare qualcosa di diverso, motivante, con *input* multimodali, dove gli studenti sarebbero stati coinvolti in modo diverso rispetto alle tradizionali lezioni frontali. Mi sono ricordata della Realtà Aumentata e visto che "mai arrendersi" è il mio motto, ne ho parlato con le mie colleghe e abbiamo deciso di intraprendere questa avventura. Non racconterò qui di quanto sia stata positiva (o negativa?) l'esperienza, ma i vantaggi e gli svantaggi che abbiamo incontrato mi hanno fatto riflettere su una serie di questioni legate alla possibilità effettiva di implementare tecnologie emergenti in vari contesti, come l'accessibilità, le infrastrutture, la disponibilità di tempo delle e degli insegnanti, le questioni economiche e sociali e, naturalmente, il *digital divide*.

Poi il primo Covid-19 ci ha colpiti, ed è coinciso con un momento della mia vita in cui sentivo il bisogno di sintetizzare le mie esperienze come insegnante di lingua italiana nel mondo in qualcosa che avrebbe avuto senso non solo per me, ma anche per le e i future/i insegnanti. Volevo raccontare la storia del mio viaggio come insegnante, con tutte le sue scoperte, con tutte quelle parti che nessuno mi aveva mai raccontato durante i miei studi. Volevo, però, anche capire di più riguardo alcuni aspetti che avevo solo

intravisto. Quando ho iniziato a leggere articoli sull'educazione delle e dei docenti, sulle tecnologie educative, sull'implementazione delle tecnologie educative per l'insegnamento delle lingue ho scoperto che le questioni su cui volevo concentrarmi erano effettivamente lì come "*gaps in the literature*", come lacune nella nostra conoscenza su questi argomenti. Il gioco era fatto. La decisione migliore sarebbe stata un dottorato di ricerca. Quale modo migliore per approfondire le mie intuizioni e raccontare tutta la storia, se non portare avanti una ricerca?

Avendo una formazione in linguistica applicata, mi sono resa conto di aver bisogno di guida, contenuti, conoscenze, competenze e un intero apparato di supporto per la mia tesi nel campo delle tecnologie educative. Ho quindi deciso di condurre il mio studio in un programma di doppio diploma (co-tutela), lavorando contemporaneamente sotto il dipartimento di linguistica applicata dell'Università per Stranieri di Siena, in Italia, e quello di tecnologia educativa dell' Universidad de Murcia, in Spagna. Pensavo di essere giunta alla sintesi del mio percorso come insegnante di lingua italiana, ma non sapevo che il mio viaggio verso Itaca, che racconto in questo mio intero lavoro, fosse appena iniziato.

Motivación personal para la investigación

La idea de este estudio de investigación se extiende en el tiempo y en el espacio. Todo comenzó en 2017 en la Universidad de Carleton, Ottawa, en Canadá, donde trabajaba como profesora de italiano en el departamento de lingüística aplicada. Una vez al mes, el departamento solía organizar un día de talleres para profesores y profesoras de idiomas con el fin de permitirnos descubrir nuevas tecnologías que podríamos implementar en nuestras aulas. Fue durante uno de esos talleres que descubrí la Realidad Aumentada Móvil. Sin embargo, cuando intenté desarrollar actividades para mis estudiantes, la plataforma no era muy fácil de usar, requería algunas habilidades de codificación, la curva de aprendizaje era bastante grande y no había plataformas alternativas de código abierto disponibles para dispositivos *iOS* y *Android* en ese momento. Por lo tanto, decidí rendirme.

Dos años después, estaba enseñando italiano en una escuela secundaria bilingüe en Rosario, Argentina. Con mis colegas, estábamos preparando una actividad de fin de año con nuestros estudiantes sobre la vida y obra del poeta italiano Dante Alighieri. Queríamos hacer algo diferente, motivador, con *input* multimodales, donde los estudiantes se involucraran de manera diferente que durante las tradicionales lecciones frontales. Recordé la Realidad Aumentada y como "nunca rendirse" es el lema de mi vida, lo mencioné a mis colegas y decidimos embarcarnos en esta aventura. No diré ahora qué tan bueno (¿o malo?) fue el viaje, pero las ventajas y desventajas que encontramos me hicieron reflexionar sobre una serie de cuestiones relacionadas con la posibilidad real de implementar tecnologías emergentes en varios contextos, como accesibilidad, infraestructuras, disponibilidad de tiempo de los profesores, cuestiones económicas y sociales y, por supuesto, la brecha digital.

De repente, llegó la primera pandemia de Covid-19 y coincidió con un momento de mi vida en el que sentía la necesidad de sintetizar mis experiencias como profesor de italiano en todo el mundo en algo que tuviera sentido no solo para mí, sino también para los futuros profesores. Quería contar la historia de mi viaje como profesora, con todos sus descubrimientos, con todas esas partes que nadie me había contado durante mis estudios. Pero también quería entender más sobre algunos aspectos que solo había vislumbrado.

Cuando empecé a leer artículos sobre la formación de profesores, sobre tecnologías educativas, sobre la implementación de tecnologías educativas para la enseñanza de idiomas, descubrí que los problemas en los que quería centrarme estaban realmente allí como "lagunas en la literatura". El juego estaba hecho entonces. La mejor decisión habría sido un doctorado. ¿Qué mejor manera de profundizar en mis intuiciones y contar toda la historia que llevar a cabo una investigación?

Teniendo una formación en lingüística aplicada, me di cuenta de que necesitaba orientación, contenidos, conocimientos, habilidades y todo un aparato de apoyo para mi tesis en el campo de las tecnologías educativas. Por lo tanto, decidí llevar a cabo mi estudio en un programa de doble titulación (*co-tutela*), trabajando al mismo tiempo bajo el departamento de lingüística aplicada de la Universidad para Extranjeros de Siena, Italia, y el de tecnología educativa de la Universidad de Murcia, España. Pensaba que estaba en la síntesis de mi camino como profesora de italiano, pero no sabía que mi viaje a Ítaca, que contaré en todo este trabajo, acababa de comenzar.

Extended Abstract

Theoretical context and motivation for the research

The study originates from the need to understand how Italian language teachers in Argentina contextualize a Mobile Augmented Reality (MAR) tool in their teaching practice, aiming to identify a set of characteristics to prioritize for the implementation of this technology in the classroom. On one hand, by exploring the teaching experience, the study aimed to understand and describe the purposes and values of teachers in action for the teaching and learning of Italian as a foreign language (ILTAL - Italian Language Teaching and Learning). On the other hand, considering the crucial role played by the socio-cultural and economic context, as well as recognizing the need for further research on the needs of teachers and students in various social and educational contexts, the study aspired to identify a set of guidelines for effective contextualization of MAR in ILTAL environments.

Conducting the study, the researcher reflected on the main themes in the field of Educational Technology, which proved useful for understanding not only the contemporary state of the discipline but also the epistemological and pedagogical assumptions of the study. Rapid technological advancements are enabling profound changes in our society, transforming how we communicate and learn (Bates, 2019). Technological development has become an important force for social, political, and economic change (Castañeda et al., 2020). In this context, the Covid-19 pandemic has played a crucial role. Policymakers, teachers, and students had to adapt to new teaching and learning ecosystems during an emergency. To recover from the economic and social consequences of the pandemic, governments embarked on recovery plans, accelerating the digitalization of the economy, society, and education. Consequently, in this new scenario, our idea of the teaching and learning environment is experiencing a transformation point, and the world of education is trying to respond to new learning needs.

An emerging technology impacting the field of language teaching and learning is Mobile Augmented Reality (MAR). By pointing the camera of a device at an object, a

QR code, or a specific place, MAR allows exposure to virtual content (Scrivner et al., 2016). Several studies (Khoshnevisan, 2021; Parmaxi & Demetriou, 2020; Taşkıran, 2019) have shown that MAR enhances motivation and peer relationships, provides meaningful learning experiences by creating semi-realistic contexts, and boosts collaboration and content memorization. However, to date, there are still several gaps to be addressed in the field of MAR implementation for language education, especially regarding the role of teachers, as many lack the technical expertise associated with content design and are not trained to handle potential issues that may arise in the classroom (J. Lee, 2022). The lack of teacher training is, therefore, a fundamental issue for MAR in language education, as it is crucial to support effective contextualization of this technology.

The gaps highlighted in the literature confirm a major problem in the field of educational technologies. On one hand, companies continuously release technological tools to the market, leading the entire education system to implement them. On the other hand, there is an urgent need to educate future generations with new learning needs. However, there is a significant discrepancy between the promises of educational innovations and the actual outcomes in terms of learning results (Rahm & Rahm-Skågeby, 2023). Therefore, further research is needed to understand how to contextualize these technologies in the new and emerging teaching and learning ecosystems (Fawns, 2022). However, in the process of developing this understanding, it is necessary to abandon old deterministic and essentialist positions that view technology in relation to pedagogy merely as a tool or as solely responsible for learning outcomes. This dichotomy must be overcome by a more complex conception of the relationship between pedagogy and technology, as advocated by socio-material and post-digital perspectives (Fawn, 2019; Jandrić et al., 2018), which the author of this study has adopted.

Therefore, the process of contextualizing a MAR tool has been observed, analyzed, and interpreted through the lens of the Entangled Pedagogy Model (EPM) developed by Fawns (2022), which highlights the need for a holistic approach where technology is conceived in its situated nature, and social and cultural factors are also considered. In the EPM, technology, teaching methods, purposes, values, and context mutually shape each other, and learning outcomes cannot be predetermined as they are contingent on complex relationships.

After identifying the pedagogical framework through which the phenomenon of interest would be observed, the study focused on defining the specific aspects to investigate, which are the values and purposes of teachers in action. From the EPM perspective, teachers, technologies, students are part of a broader conception of pedagogy, along with methods, purposes, values, and context (Fawns, 2022). However, among all these factors, the values and purposes of teachers are the foundation of the reasons for making specific decisions regarding the teaching and learning experience. In the context of this study, as will be detailed extensively throughout the work, the values and purposes in action were interpreted in terms of teachers' reflection with the situation (Schön, 1983) and were investigated through the constructs of Teacher Pedagogical Beliefs (TPB).

The TPBs investigated were perceived usefulness and perceived ease of use, while other factors considered were teachers' levels of anxiety and comfort with the technological tool. Due to the entanglement of all involved elements, to understand teachers' values and purposes in action, external agents such as infrastructure or the availability of technical support for teachers were also considered. The process of contextualizing the tool was understood in terms of "Tinkering," according to Bardone et al. (2023), who describe it as an adaptive, unplanned process that is open and reactive to what happens in action, during which goals cannot be fully specified in advance.

Objectives and Research Questions

The purpose of the study was twofold. On one hand, the research aimed to explore the purposes and values of teachers in action during the process of implementing MAR. On the other hand, the study aimed to identify a set of guidelines for integrating MAR in the Italian language classroom, beneficial for both Italian language teachers and learning platform designers. By identifying the main challenges and opportunities teachers face when designing and implementing activities with MAR, it was possible to deepen the understanding of how to contextualize this technology. The objectives described here were achieved by guiding the research questions (RQ) presented below along with the aims (A) of the study.

A1: To explore teachers' experiences of Mobile Augmented Reality contextualization for the Italian Language Teaching and Learning in order to understand and describe teachers' value and purposes *in action.*

A2: To contribute to the development of actionable knowledge by identifying a set of guidelines for the contextualization of MAR for the ILTAL, based on the exploration of teachers' needs in action.

Overarching question: Which main characteristics are to be prioritize during the process of Mobile Augmented Reality contextualization for the Italian Language Teaching and Learning according to teachers' perspectives?

RQ1: What values and purposes do teachers attribute to MAR for the ILTAL classroom?

RQ2: How do teachers describe the experience of designing MAR activities for the ILTAL with the Metaverse open-source authoring tool?

RQ3: What do teachers consider to be the main challenges and opportunities of the contextualization of MAR for the ILTAL classroom?

Research Methodology

To achieve the study's objectives, a qualitative methodological approach was adopted, framing the research within the interpretive paradigm and assuming a relativistic epistemological stance (Flick, 2018). According to Barira Bakhtawar (2020), in contemporary pluralized society, phenomena must be studied from within to explore how they are experienced by the studied community, which is the one that truly attributes meaning to them. Therefore, reflecting on the fact that case study research allows investigators to deeply focus on a specific case, it was adopted as the research method for the study.

Due to the number of Italian courses and the historical, cultural, and economic relations between Argentina and Italy (Patat, 2004), the country was considered a

significant context for the development of the research. Following the principles of intentional sampling, ten institutions were contacted, and a total of four schools and six teachers participated. Data were collected during four different stages and through a series of instruments. During Stage 1 (pre-design), two online focus groups were conducted, aiming to provide a detailed presentation of the research project and a general introduction to the Metaverse platform. Additionally, the objective was to gather information on teachers' initial beliefs and attitudes towards the experience. To collect information on the professional profiles of the participants, a brief online survey was sent, along with tutorials developed to support the learning process of Metaverse. During Stage 2 (design), teachers independently designed MAR learning activities, and data were collected through online semi-structured interviews. In Stage 3 (implementation), the activities were implemented in the classroom, and observations were made. Finally, in Stage 4 (post-implementation), teachers reflected on the main issues and opportunities encountered, sharing their perspectives with the researcher through online semi-structured interviews. The data were analyzed using a Reflexive Thematic Analysis approach (Braun & Clarke, 2022) with the NVivo software.

Results and conclusions

The results confirmed previous studies indicating that Mobile Augmented Reality (MAR) can promote student engagement and cooperative learning. However, they also highlighted the need to educate students on the responsible use of mobile phones during the implementation of activities. The overall experience was described as positive, with participants finding classroom management with MAR less problematic than initially expected. Despite this positive feedback, participants encountered technical challenges related to infrastructure, as well as difficulties stemming from language barriers during the process of learning to design activities. Furthermore, participants emphasized the lack of teacher training for technology implementation provided by their institutions.

The description of teachers' experiences allowed for an understanding of their needs in action, leading to the identification of guidelines for contextualizing MAR for Italian language teaching. These guidelines could be adopted in future studies and in

various contexts to develop a framework of best practices and expand our knowledge of these new scenarios in language education.

Riassunto ampliato

Il presente lavoro di ricerca parte dalla necessità di comprendere le modalità con cui gli insegnanti di lingua italiana in Argentina contestualizzano uno strumento di Realtà Aumentata Mobile (MAR, nell'acronimo inglese – *Mobile Augmented Reality*) nella loro pratica didattica, al fine di identificare un insieme di caratteristiche da privilegiare per un'implementazione efficace di questa tecnologia emergente nella classe di lingua italiana per studenti adolescenti. Da un lato, esplorando le esperienze di contestualizzazione della MAR per l'insegnamento e apprendimento della lingua italiana (ILTAL, nell'acronimo inglese – *Italian Language Teaching and Learning*), lo studio mirava a comprendere e descrivere gli scopi e i valori delle e degli insegnanti in azione. Dall'altro, considerando il ruolo cruciale giocato dal contesto socio-culturale ed economico quando si tratta di implementare delle tecnologie educative, e riconoscendo la necessità di ulteriori ricerche sulle esigenze delle/gli insegnanti e delle/gli studenti in vari contesti sociali ed educativi, lo studio di ricerca aspirava a essere un contributo allo sviluppo di conoscenze pratiche sull'integrazione della MAR per l'insegnamento e apprendimento della lingua italiana, identificando delle linee guida per un'efficace contestualizzazione di questo strumento negli ambienti di ILTAL.

Lo studio prende avvio da una necessaria premessa teorica, in cui si considerano le caratteristiche degli ambiti di studio in cui la ricerca si colloca più rilevanti ai fini della ricerca stessa. Una considerazione delle principali questioni nel campo della Tecnologia Educativa è stata utile per comprendere non solo lo stato contemporaneo della disciplina, ma anche le premesse epistemologiche e pedagogiche del presente lavoro. Il rapidissimo sviluppo tecnologico che viviamo ogni giorno sta mettendo in atto profondi cambiamenti nella nostra società, trasformando il modo in cui comunichiamo e apprendiamo (Bates, 2019). Lo sviluppo tecnologico è diventato una forza principale di cambiamento sociale, politico ed economico nelle società di tutto il mondo (Castañeda et al., 2020). In questo contesto, la pandemia da Covid-19 ha giocato un ruolo cruciale. I *policy-makers*, le/gli insegnanti, le studentesse e gli studenti hanno dovuto adattarsi a ecosistemi di insegnamento e apprendimento completamente diversi nel contesto di un'emergenza. Per riprendersi dalle conseguenze economiche e sociali della pandemia, i governi hanno intrapreso piani di ripresa, accelerando la digitalizzazione dell'economia, della società e

dell'istruzione. Di conseguenza, in un tale nuovo scenario, la nostra idea di ciò che costituisce un ambiente di insegnamento e apprendimento sta vivendo un punto di trasformazione. Il mondo dell'istruzione, in generale, e dell'educazione linguistica, in particolare, sta cercando attualmente di rispondere alle nascenti esigenze di apprendimento, cercando di esplorare nuovi approcci e soluzioni.

Una tecnologia emergente che sta influenzando il campo dell'istruzione e dell'apprendimento delle lingue è la Realtà Aumentata, che, puntando la fotocamera di un dispositivo su un oggetto, un codice QR o un luogo specifico, consente all'utente di essere esposto a contenuti virtuali (Scrivner et al., 2016). L'ubiquità di Internet e la diffusione dei dispositivi mobili hanno reso l'AR più accessibile rispetto al passato. Anche se la Realtà Aumentata Mobile non è stata ancora implementata ampiamente per l'educazione linguistica, diversi studi ne hanno dimostrato i vantaggi (Khoshnevisan, 2021; Parmaxi & Demetriou, 2020). La MAR migliora la motivazione e le relazioni con i pari (Taşkıran, 2019), fornisce esperienze di apprendimento significative generando contesti semi-realistici (Zhang et al., 2020), potenzia la collaborazione tra gli interessati e la memorizzazione dei contenuti, oltre ad influenzare positivamente l'intero processo di apprendimento (Pegrum, 2021).

Nonostante i numerosi vantaggi della MAR nel campo dell'apprendimento delle lingue, ad oggi ci sono ancora una serie di lacune che devono essere affrontate, soprattutto per quanto riguarda il ruolo delle/degli insegnanti come disegnatori e facilitatori di attività in AR (Khoshnevisan, 2021). Gli insegnanti sono prevalentemente poco familiari con la MAR, in molti casi non dispongono delle competenze tecniche associate alla progettazione di materiali e non sono formati per gestire eventuali problemi che potrebbero sorgere quando la MAR viene implementata in classe (J. Lee, 2022). La mancanza di formazione per le/gli insegnanti è quindi una questione fondamentale della MAR nell'educazione linguistica, in quanto cruciale per supportare un'efficace integrazione della tecnologia nell'aula di lingue. Per affrontare questa lacuna, il presente studio si è concentrato sulle esperienze di progettazione e implementazione di attività di MAR in classe, attraverso uno strumento *open-source*, il Metaverse, da parte delle/degli insegnanti di lingua italiana

Le lacune nella letteratura qui evidenziate confermano un problema principale nel campo delle tecnologie educative al giorno d'oggi. Da un lato, al giorno d'oggi le aziende

mettono continuamente sul mercato tecnologie emergenti, molte delle quali hanno una durata molto breve nonostante la loro innovatività (Sukackė, 2019), spingendo *policy-makers*, istituzioni, insegnanti, educatori, studenti, studentesse e l'intero sistema educativo ad implementarle. D'altro canto, c'è un urgente bisogno di educare le future generazioni, caratterizzate da nuove esigenze di apprendimento. Tuttavia, esiste ancora una grande discrepanza tra le promesse delle innovazioni educative e le effettive conseguenze di queste in termini di risultati di apprendimento (Rahm & Rahm-Skågeby, 2023). Sono quindi necessarie ulteriori ricerche per comprendere come contestualizzare significativamente tali tecnologie nei nuovi ed emergenti ecosistemi di insegnamento e apprendimento (Fawns, 2022). Nel tentativo di sviluppare questa nuova conoscenza, è necessario abbandonare le vecchie posizioni deterministe ed essenzialistiche, che vedono la tecnologia in relazione all'educazione, anche linguistica, come semplice strumento o come unico responsabile dei risultati di apprendimento. Tale dicotomia dovrebbe essere superata da una concezione più complessa e meno semplicistica del rapporto tra istruzione e tecnologia, come sostenuto dalle prospettive socio-materiali e post-digitali (Barad, 2007; Fawn, 2019; Jandrić et al., 2018), che l'autrice di questo studio ha abbracciato nel condurre la propria ricerca.

Considerate le premesse filosofiche ed epistemologiche del lavoro, il processo di progettazione e implementazione di attività di apprendimento con uno strumento di MAR per l'insegnamento e l'apprendimento della lingua italiana da parte dei partecipanti coinvolti è stato osservato, analizzato e interpretato attraverso la lente *dell'Entangled Pedagogy Model* (EPM) sviluppato da Fawns (2022). Lo studioso sottolinea la necessità di un approccio olistico alle Tecnologie Educative, dove la tecnologia è concepita nella sua natura situata, e dove, pertanto, fattori sociali, culturali e una serie di specificità legate ai contesti d'uso sono considerati al momento della sua implementazione a fini educativi. Nell' EPM, tecnologia, metodi di insegnamento, scopi, valori e contesto si modellano reciprocamente e i risultati di apprendimento non possono essere determinati in anticipo, poiché sono contingenti a relazioni complesse (Fawns, 2022).

Dopo aver identificato il quadro pedagogico attraverso il quale osservare il fenomeno di riferimento, la ricercatrice si è focalizzata sull'individuazione e la definizione degli aspetti specifici da ricercare, essendo questi i valori e gli scopi che le e gli insegnanti in azione hanno attribuito allo strumento tecnologico ai fini dell'educazione

linguistica. Nella prospettiva dell'EP, i ruoli delle/degli insegnanti, delle tecnologie, delle studentesse e degli studenti e degli altri fattori interessati sono intrecciati all'interno di una concezione più ampia di pedagogia, insieme ai metodi, agli scopi, ai valori e al contesto (Fawns, 2022). Tuttavia, tra tutti questi fattori, i valori e gli scopi delle e degli insegnanti sono alla base delle ragioni per cui le decisioni più importanti riguardo l'esperienza di insegnamento e apprendimento vengono intraprese (Dron, 2022; Fawns, 2022; S.-M. Lee, 2019). Nel contesto di questo studio, come sarà ampiamente dettagliato durante il lavoro, i valori e gli scopi delle e degli insegnanti in azione sono stati interpretati in termini di *teachers' reflection with the situation* (Schön, 1983; Holmberg, 2014) e ricercati attraverso i costrutti delle Attitudini (TA – *Teachers' Attitude*) e delle *Teacher Beliefs (TB)*, perché, come ha sottolineato Fawns (2022, p. 717), "i valori consistono nelle credenze su ciò che più conta nel processo di apprendimento e insegnamento".

Le TPB prese in considerazione ai fini della ricerca sono state l'Utilità Percepita (PU) e la Facilità d'Uso Percepita (PEU), mentre altri fattori considerati erano i livelli di Ansia e Comfort (AC) delle/degli insegnanti con lo strumento di MAR, e altri Agenti Esterni (EA- *External Agents*). Considerando la prospettiva dell'EPM, e quindi dell'intreccio di tutti gli elementi coinvolti in un ecosistema di insegnamento e apprendimento con tecnologia, era infatti necessario considerare anche altri fattori esterni (EA), per poter pienamente comprendere i valori e gli scopi delle/degli insegnanti in azione. Esempi di questi EA possono essere il tipo di infrastrutture presenti nelle scuole, la disponibilità di supporto tecnico per le/gli insegnanti o i vincoli di tempo, così come le limitazioni legate a fattori sociali, economici e culturali. Infine, è risultato necessario definire i termini in cui è stato inteso il processo stesso di contestualizzazione dello strumento, inteso in termini di *"Tinkering"*, secondo la prospettiva di Bardone et al. (2023), che lo descrivono come un processo di continuo adattamento, non pianificato, aperto e reattivo a ciò che accade in azione, con ciò che le/gli insegnanti hanno a disposizione e durante il quale gli obiettivi non possono essere completamente specificati in anticipo.

Obiettivi e domande di ricerca

Come già presentato in precedenza, lo scopo dello studio era duplice. Da un lato, la ricerca mirava a esplorare gli scopi e i valori delle e degli insegnanti in azione durante il processo di implementazione della MAR. Dall'altro, lo studio mirava a identificare un insieme di linee guida per l'integrazione della MAR per l'insegnamento della lingua italiana, dirette tanto alle/agli insegnanti, quanto ai disegnatori di piattaforme d'apprendimento linguistico tramite la MAR. Attraverso l'identificazione delle principali sfide e opportunità che le/gli insegnanti sperimentano durante il processo di disegno e implementazione di attività di MAR è stato possibile approfondire la nostra comprensione sulle modalità di contestualizzazione di questa tecnologia nella classe di lingua italiana. Gli obiettivi qui descritti sono stati raggiunti attraverso le seguenti domande di ricerca (RQ- *Research Questions*), riportate in basso insieme agli Obiettivi (A- *Aims*) stessi dello studio.

A1: Esplorare le esperienze delle/gli insegnanti di contestualizzazione della Realtà Aumentata Mobile per l'insegnamento e l'apprendimento della lingua italiana al fine di comprendere e descrivere i valori e gli scopi delle/degli insegnanti in azione.
A2: Contribuire allo sviluppo di conoscenze pratiche identificando un insieme di linee guida per la contestualizzazione della MAR per l'insegnamento della lingua italiana, basato sulla previa esplorazione degli effettivi bisogni delle/degli insegnanti in azione.

Overarching Question: Quali sono le principali caratteristiche da privilegiare durante il processo di contestualizzazione della Realtà Aumentata Mobile per l'insegnamento e l'apprendimento della lingua italiana secondo le prospettive delle/degli insegnanti?
RQ1: Quali valori e scopi attribuiscono le/gli insegnanti alla MAR per la classe di lingua italiana?
RQ2: Come descrivono le/gli insegnanti l'esperienza di progettare attività di MAR per l'insegnamento della lingua italiana con lo strumento open-source Metaverse?
RQ3: Quali sono secondo la prospettiva delle/degli insegnanti le principali sfide e opportunità della contestualizzazione della MAR per la classe di lingua italiana?

Metodologia

Per raggiungere gli obiettivi dello studio, la ricercatrice ha adottato un approccio metodologico interamente qualitativo, incorniciando la ricerca nel paradigma interpretativo e assumendo una posizione epistemologica relativista (Flick, 2018). Secondo Barira Bakhtawar (2020), nella società 'pluralizzata' contemporanea i fenomeni devono essere studiati dall'interno, al fine di esplorare e comprendere come vengono vissuti dalla comunità oggetto di studio, che è chi effettivamente attribuisce loro significato. Pertanto, riflettendo sul fatto che lo studio di caso consente al ricercatore di concentrarsi profondamente su un caso specifico pur mantenendo una prospettiva olistica sul fenomeno in esplorazione (Yin, 2018), è stato adottato come metodo di ricerca per il presente studio.

A causa del numero di corsi di lingua italiana e delle relazioni storiche, culturali ed economiche tra Argentina e Italia (Patat, 2004), il Paese è stato considerato un contesto significativo per lo sviluppo della ricerca. Seguendo i principi del campionamento intenzionale, 10 istituzioni sono state invitate a partecipare allo studio e un totale di quattro scuole e sei insegnanti hanno deciso di farlo. I dati sono stati raccolti durante quattro diverse fasi e attraverso una serie di strumenti. Durante la Fase 1 (Pre-design), il ricercatore ha condotto due Gruppi Focali Online (OFGs), con l'obiettivo di fornire una presentazione dettagliata del progetto di ricerca, così come una presentazione generale della piattaforma Metaverse. L'obiettivo era inoltre quello di raccogliere dati riguardanti le prime convinzioni e le prime attitudini delle/degli insegnanti verso l'esperienza. Per raccogliere informazioni sui profili professionali delle e dei partecipanti, è stato inviato loro un breve sondaggio online a seguito dei Focus Group, insieme a dei *tutorial* sviluppati dalla ricercatrice per sostenere le e i docenti durante il processo di apprendimento della piattaforma di MAR. Durante la Fase 2 (Design), le/gli insegnanti hanno progettato autonomamente le attività di apprendimento in MAR e i dati sono stati raccolti attraverso interviste online semi-strutturate. Nella Fase 3 (Implementazione), le attività sviluppate sono state implementate in classe e sono state condotte osservazioni. Infine, nella Fase 4 (Post-Implementazione), le/gli insegnanti hanno riflettuto sui principali problemi e opportunità incontrati, condividendo le loro prospettive con il ricercatore attraverso interviste online semi-strutturate. I dati sono stati analizzati attraverso un approccio di *Reflexive Thematic Analysis* (Braun & Clarke, 2022) con il software NVivo.

Risultati e conclusioni

I risultati confermano studi precedenti secondo i quali la MAR è in grado di promuovere la motivazione e il coinvolgimento degli studenti e delle studentesse, l'apprendimento cooperativo e la creazione di contesti di apprendimento significativi. Tuttavia, le/gli insegnanti hanno anche sottolineato la necessità di educare studenti e studentesse a un uso responsabile degli *smartphone* durante l'implementazione delle attività, così come il fatto che l'implementazione della MAR potrebbe migliorare non solo le relazioni tra pari, ma anche tra insegnanti e studenti/studentesse. Nel complesso le/i docenti hanno descritto l'esperienza come positiva e hanno considerato la gestione della classe con la MAR meno problematica di quanto si aspettassero inizialmente. Sono però state riscontrate anche una serie di sfide tecniche, principalmente legate alle infrastrutture disponibili, insieme a difficoltà relative alle barriere linguistiche durante il processo di apprendimento della progettazione delle attività. Inoltre, i e le partecipanti hanno sottolineato la mancanza di formazione e supporto delle/degli insegnanti nei processi di utilizzo di tecnologie in aula da parte delle loro istituzioni. La descrizione delle esperienze delle e degli insegnanti, che era il primo obiettivo dello studio, ha permesso di comprendere i bisogni delle e dei docenti in azione, un passo preliminare cruciale che ha portato all'identificazione di un insieme di linee guida per la contestualizzazione della MAR per l'insegnamento della lingua italiana. Queste linee guida potrebbero essere adottate in futuro in più contesti, al fine di sviluppare un quadro di migliori pratiche e ampliare le nostre conoscenze su questi nuovi scenari nell'educazione linguistica.

Resumen extenso

El estudio parte de la necesidad de comprender las formas en que las y los docentes de italiano en Argentina contextualizan una herramienta de Realidad Aumentada Móvil (MAR) en su práctica docente, con el fin de identificar un conjunto de características a priorizar para la implementación de esta tecnología en el aula. Por un lado, al explorar la experiencia docente, el estudio tuvo como objetivo comprender y describir los propósitos y valores de las y los docentes *en acción* para la enseñanza y aprendizaje del italiano como lengua extranjera (ILTAL- *Italian Language Teaching and Learning*). Por otro lado, considerando el papel crucial desempeñado por el contexto socio-cultural y económico, así como reconociendo la necesidad de ulteriores investigaciones sobre las necesidades de docentes y estudiantes en varios contextos sociales y educativos, el estudio aspiraba a identificar un conjunto de pautas para una contextualización efectiva de la MAR en los entornos de ILTAL.

Al llevar a cabo el estudio, la investigadora ha reflexionado sobre el contexto los principales temas en el campo de la Tecnología Educativa, que ha resultado útil para comprender no solo el estado contemporáneo de la disciplina, sino también los supuestos epistemológicos y pedagógicos del estudio. Los rápidos avances tecnológicos están permitiendo cambios profundos en nuestra sociedad, transformando la forma en que nos comunicamos y aprendemos (Bates, 2019). El desarrollo tecnológico se ha convertido en una fuerza importante de cambio social, político y económico (Castañeda et al., 2020). En este contexto, la pandemia de Covid-19 ha desempeñado un papel crucial. Los responsables políticos, las y los docentes y los estudiantes tuvieron que adaptarse a nuevos ecosistemas de enseñanza y aprendizaje en el contexto de una emergencia. Para recuperarse de las consecuencias económicas y sociales de la pandemia, los gobiernos emprendieron planes de recuperación, acelerando la digitalización de la economía, la sociedad y la educación. En consecuencia, en este nuevo escenario, nuestra idea de entorno de enseñanza y aprendizaje está experimentando un punto de transformación y el mundo de la educación está tratando de responder a nuevas necesidades de aprendizaje.

Una tecnología emergente que está impactando el campo de la enseñanza y aprendizaje de idiomas es la Realidad Aumentada Móvil (MAR – *Mobile Augmented Reality*) la cual, al apuntar la cámara de un dispositivo hacia un objeto, un código QR o

un lugar específico, permite la exposición a contenidos virtuales (Scrivner et al., 2016). Varios estudios (Khoshnevisan, 2021; Parmaxi & Demetriou, 2020; Taşkıran, 2019) han demostrado que la MAR mejora la motivación y las relaciones entre pares, proporciona experiencias de aprendizaje significativas generando contextos semi-realistas, potencia la colaboración y la memorización de contenidos.

Sin embargo, hasta la fecha existen todavía varias lagunas que deben abordarse en el campo de implementación de la MAR para la educación lingüística, especialmente en relación al papel de las y los docentes, en cuanto en muchos casos no cuentan con la experiencia técnica asociada al diseño de contenidos y no están capacitados para manejar los posibles problemas que puedan surgir en el aula (J. Lee, 2022). La falta de formación docente es, por lo tanto, una cuestión fundamental de la MAR en la educación lingüística, en cuanto resulta crucial para apoyar una contextualización efectiva de esta tecnología.

Las lagunas en la literatura aquí resaltadas confirman un problema principal en el campo de las tecnologías educativas. Por un lado, las empresas lanzan al mercado herramientas tecnológicas continuamente, lo que lleva a todo el sistema educativo a implementarlas. Por otro lado, hay una necesidad urgente de educar futuras generaciones con nuevas necesidades de aprendizaje. Sin embargo, existe una gran discrepancia entre las promesas de las innovaciones educativas y las consecuencias reales en términos de resultados de aprendizaje (Rahm & Rahm-Skågeby, 2023). Por lo tanto, se necesitan más investigaciones para comprender cómo contextualizar estas tecnologías en los nuevos y emergentes ecosistemas de enseñanza y aprendizaje (Fawns, 2022). Sin embargo, en el proceso de desarrollar esta comprensión, es necesario abandonar las antiguas posiciones deterministas y esencialistas, que ven la tecnología en relación con la pedagogía como una simple herramienta o como la única responsable de los resultados de aprendizaje. Esta dicotomía debe ser superada por una concepción más compleja de la relación entre pedagogía y tecnología, como defienden las perspectivas socio-materiales y post-digitales (Fawn, 2019; Jandrić et al., 2018), que la autora de este estudio ha adoptado.

Por lo tanto, el proceso de contextualización de una herramienta MAR ha sido observado, analizado e interpretado a través de la lente del Modelo de Pedagogía Entrelazada (EPM – *Entangled Pedagogy Model*) desarrollado por Fawns (2022), que destaca la necesidad de un enfoque holístico, donde la tecnología se concibe en su naturaleza situada, y donde se consideran también factores sociales y culturales. En el

EPM, la tecnología, los métodos de enseñanza, los propósitos, los valores y el contexto se moldean mutuamente y los resultados del aprendizaje no pueden determinarse de antemano, ya que son contingentes en relaciones complejas.

Después de identificar el marco pedagógico a través del cual el fenómeno de interés sería observado, el estudio se ha enfocado en definir los aspectos específicos a investigar, que son los valores y los propósitos de los y las docentes en acción. Desde la perspectiva del EPM, los y las docentes, las tecnologías, los y las estudiantes son parte de una concepción más amplia de la pedagogía, junto con métodos, propósitos, valores y contexto (Fawns, 2022). Sin embargo, entre todos estos factores, los valores y los propósitos de los y las docentes son la base de las razones por las cuales se toman decisiones específicas con respecto a la experiencia de enseñanza y aprendizaje. En el contexto de este estudio, como se detallará ampliamente durante el trabajo, los valores y los propósitos en acción fueron interpretados en términos de *teachers' reflection with the situation* (Schön, 1983) y fueron investigados a través de los constructos de actitudes y creencias pedagógicas de las y los docentes (TPB- *Teacher Pedagogical Beliefs*).

Los TPB investigados fueron la utilidad percibida y la facilidad de uso percibida, mientras que otros factores considerados fueron los niveles de ansiedad y comodidad de las y los docentes con la herramienta tecnológica. Debido al entrelazamiento de todos los elementos involucrados, para comprender los valores y propósitos de los y las docentes en acción también se han considerado los agentes externos, como las infraestructuras o la disponibilidad de soporte técnico para los y las docentes. En cuanto al proceso de contextualización de la herramienta, se ha entendido en términos de "*Tinkering*", según la perspectiva de Bardone et al. (2023), quienes lo describen como un proceso adaptativo, no planificado, abierto y reactivo a lo que sucede en la acción, durante el cual los objetivos no pueden ser completamente especificados de antemano.

Objetivos y preguntas de investigación

El propósito del estudio era doble. Por un lado, la investigación buscaba explorar los propósitos y valores de las y los docentes en acción durante el proceso de implementación de la MAR. Por otro lado, el estudio tenía como objetivo identificar un conjunto de pautas para la integración de la MAR en el aula de italiano, tanto para docentes de italianos como

para los diseñadores de plataformas de aprendizaje. A través de la identificación de los principales desafíos y oportunidades que enfrentan las y los docentes al diseñar e implementar actividades en MAR, fue posible profundizar en la comprensión de cómo contextualizar esta tecnología. Los objetivos aquí descritos se lograron mediante la orientación de las preguntas de investigación (RQ- *Research Questions*) que se presentan a continuación junto con los objetivos (A- *Aims*) del estudio.

A1: Explorar las experiencias de las y los docentes en la contextualización de la Realidad Aumentada Móvil para la Enseñanza y el Aprendizaje del Idioma Italiano con el fin de comprender y describir los valores y propósitos de las y los docentes en acción.
A2: Contribuir al desarrollo de conocimiento aplicable identificando un conjunto de pautas para la contextualización de la MAR para el ILTAL, basado en la exploración de las necesidades de las y los docentes en acción.

Pregunta Global: ¿Cuáles son las principales características a privilegiar durante el proceso de contextualización de la Realidad Aumentada Móvil para la enseñanza y el aprendizaje de la lengua italiana según las perspectivas de los y las docentes?
RQ1: ¿Qué valores y propósitos atribuyen los y las docentes a la implementación de MAR para la clase de IL?
RQ2: ¿Cómo describen las y los docentes la experiencia de diseñar actividades de MAR para la enseñanza y el aprendizaje de la lengua italiana con la herramienta de código abierto *Metaverse*?
RQ3: ¿Cuáles consideran los y las docentes como los principales desafíos y oportunidades de la contextualización de la MAR para la clase de IL?

Metodología

Para alcanzar los objetivos del estudio, se ha adoptado un enfoque metodológico cualitativo, enmarcando la investigación en el paradigma interpretativo y asumiendo una posición epistemológica relativista (Flick, 2018). Según Barira Bakhtawar (2020), en la sociedad pluralizada contemporánea, los fenómenos deben estudiarse desde adentro, para

explorar cómo son experimentados por la comunidad objeto de estudio, que es quien realmente les atribuye significado. Por lo tanto, reflexionando sobre el hecho de que el estudio de caso permite a los investigadores concentrarse profundamente en un caso específico, se adoptó como método de investigación para el estudio.

Debido al número de cursos de italiano y a las relaciones históricas, culturales y económicas entre Argentina e Italia (Patat, 2004), el país fue considerado un contexto significativo para el desarrollo de la investigación. Siguiendo los principios del muestreo intencional, se han contactado a 10 instituciones y un total de cuatro escuelas y seis docentes han participado. Los datos fueron recopilados durante cuatro etapas diferentes y a través de una serie de instrumentos. Durante la Etapa 1 (Pre-diseño), se han llevado a cabo dos grupos focales en línea, con el objetivo de proporcionar una presentación detallada del proyecto de investigación, así como una presentación general de la plataforma *Metaverse*. Además, el objetivo era recopilar información sobre las primeras creencias y actitudes de docentes hacia la experiencia. Para recopilar información sobre los perfiles profesionales de los y las participantes, se les ha enviado una breve encuesta en línea, junto con tutoriales desarrollados para apoyar el proceso de aprendizaje del *Metaverse*. Durante la Etapa 2 (Diseño), las y los docentes han diseñado de manera autónoma las actividades de aprendizaje en MAR y los datos fueron recopilados a través de entrevistas semiestructuradas en línea. En la Etapa 3 (Implementación), las actividades fueron implementadas en clase y se han realizado observaciones. Finalmente, en la Etapa 4 (Post-Implementación), las y los docentes han reflexionado sobre los principales problemas y oportunidades encontrados, compartiendo sus perspectivas con la investigadora a través de entrevistas semiestructuradas en línea. Los datos fueron analizados mediante un enfoque de Análisis Temático Reflexivo (Braun & Clarke, 2022) con el software NVivo.

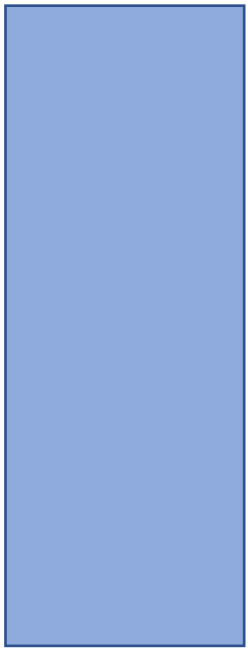
Resultados y conclusiones

Los resultados han confirmado estudios previos según los cuales la MAR es capaz de promover la participación de los estudiantes y el aprendizaje cooperativo. Sin embargo, también se ha destacado la necesidad de educar a los y las estudiantes sobre un uso responsable de los teléfonos celulares durante la implementación de las actividades. La

experiencia general ha sido descripta como positiva y los y las participantes han definido la gestión del aula con la MAR menos problemática de lo que esperaban inicialmente. Sin embargo, también se han enfrentado desafíos técnicos relacionados con las infraestructuras, junto con dificultades relacionadas con las barreras lingüísticas durante el proceso de aprendizaje de diseño de actividades. Además, los y las participantes han destacado la falta de formación docente para la implementación de tecnologías por parte de sus instituciones.

La descripción de las experiencias de los y las docentes ha permitido comprender sus necesidades en acción y, consecuentemente, la identificación de directrices para la contextualización de la MAR para la enseñanza del italiano. Estas directrices podrían adoptarse en estudios futuros y en más contextos, con el fin de desarrollar un marco de mejores prácticas y ampliar nuestro conocimiento sobre estos nuevos escenarios en la educación lingüística.

SECTION 1- LITERATURE REVIEW



1 TEACHING, LEARNING AND THE ROLE OF EDUCATIONAL TECHNOLOGIES IN THE POST DIGITAL ERA

1.1 (Post) Digital ecosystems, teaching and learning. A screenshot.

The rapid technological advances that the world is experiencing nowadays are enabling profound changes in our society with a pace never seen before. Even though a number of technologies have always accompanied human lives from the dawn of time, since written documents started to appear in ancient societies at least according to Bates (2019), the crucial difference between the previous ages and our age is the rapid pace of technology development and the direct consequences of it in our daily lives (Bates, 2019). These rapid transformations are demanding humanity to live in a complex, dynamic and everchanging world, where always new ecosystems and values are created (Díaz Fernández, 2020). Brand new Information and Communication Technologies (ICTs) are continuously appearing on the market and many of them, despite their innovativeness, have a very short span of life, being replaced (or integrated) by a new technology very soon (Sukackė, 2019). The changes implemented by 'ever emerging' ICTs are influencing our economic and political systems, transforming not only our entire idea of society, but also the way in which we communicate with each other and, above all, the way in which we learn (Bates, 2019). Technological development has become a major force of social, political and economic change in our society (Castañeda et al., 2020), enabling a profound transformation which consists of a complex relationship between the technology, the system, the society itself and imaginaries of future (Rahm & Rahm-Skågeby, 2023). Consequently, our notion of what constitute a teaching-and-learning environment is living a point of transformation as well. The attempts of the field of education to adjust to this mutable reality are on the agenda of the research discourse (Fawns, 2022; Prendes Espinosa, 2018; Prendes Espinosa & Serrano Sánchez, 2016), also considering the fact that most of the contemporary educational institutions were conceived and built for an industrial age, and not for a digital one.

Because of the introduction of megatrend technologies such as educational robots and robotics, Virtual and Augmented Realities (VR and AR), serious games, wearable devices and Artificial Intelligence (AI), the world of education is currently attempting to

respond to new emerging learning needs, trying to understand which approaches and solutions could work best. In contemporary teaching-and-learning environments, students, educators and instructors need to develop new sets of skills and competences, that emerge as an urgent need when ICTs such as the technologies mentioned above are introduced. However, although the urgent need to educate future generations, the gap between the promises of educational innovation and the actual state of such innovation in terms of teaching-and-learning consequences does not seem to be aligned (Rahm & Rahm-Skågeby, 2023).

Another fundamental factor to consider in such a context is the Covid-19 pandemic. The pandemic entailed profound changes in many aspects of our lives, including the field of education. Policy makers, educators, teachers and students suddenly had to adapt to completely different teaching and learning ecosystems, within the frame of an emergency (Eradze et al., 2021). The impact of the Covid-19 pandemic on our routines, as well as on our relationships with technologies, could be described as a major point of inflection of our age. In order to recover from the economic and social consequences of the pandemic, governments and institutions engaged in significant investments as part of recovery plans, accelerating the digitalization of economy, society and education. With the 'Next generation Europe' plan, for example, the European Union is supporting the digital transition of European Countries, promoting the development of a European digital education ecosystem[1].

Recovery initiatives, as well as the plethora of factors considered so far must be located in the wider context of a world where climate change and massive migrations are representing two major issues for a number of governments, where the economic, cultural and digital divide is ever growing and the distance between developed and underdeveloped countries is always wider (Castañeda et al., 2020). In such a global scenario, where, on the one hand, the market is pushing for the development of ever emerging new technological artifacts and solutions and, on the other, the field of education is struggling to shape itself to such a profound transformation, how can we assure a democratic and sustainable development of the implementation of technology

[1] https://next-generation-eu.europa.eu/index_it

for educational purposes? Which is today, then, the nature and the role of the Educational technology (ET)?

1.2 An identity crisis: Educational Technology, who am I?

The overgoing transformations described in the previous paragraph had consequences on the trajectory of ET as a field of study. As (Biesta et al., 2015) already underlined few years ago, in the everchanging dynamic of our time there are only few moments of stability to develop and consolidate ideas in the field. Moreover, Castañeda et al. (2020) argued that "[…] in the academic ET there is a certain sense that the discipline needs to reflect deeply on its epistemological assumptions, its objectives, its methods of research and theoretical construction, as well as on its practices (s.d., p. 242)". Therefore, a consideration of the current issues in the field of ET is useful to understand not only the contemporary status of the discipline, but also the epistemological assumptions and the pedagogical premises of the present work. Henceforth, the main aspects of the overall framework of the field of ET will be presented below and discussed in more details afterwards.

First of all, one major point of reflection regards the manner in which the relation between technology and education is conceived. The consideration of this aspect is fundamental, because it allows to overcome the crucial issue of the lack of pedagogical foundation in ET research studies (Bartolomé et al., 2018; Zawacki-Richter et al., 2019). Regarding this aspect, the study embraces the philosophy of socio-material and post-digital perspectives (Barad, 2007; Fawns, 2022; Jandrić et al., 2018), according to which it is necessary to overcome traditional deterministic and essentialist positions, which sees technology in relation to pedagogy as either a mere tool or as the only responsible of learning outcomes. As it will be discussed in more details afterwards, according to the post-digital perspective such a dichotomy in the pedagogy-technology relation should be overcome by a more complex and less simplistic conceptualization of its epistemological and theoretical assumptions. In order to define how the pedagogy-technology relationship is understood in the scope of the present research study, a brief overview of the history of

such relation will be considered in the next paragraph. Together with a new conceptualization of the pedagogy-technology relation, the other crucial aspect worth attending in defining the current status of ET relates to the necessity of a new and more open conceptualization of technology itself (Castañeda et al., 2020; Prendes Espinosa, 2018). The poor theoretical conceptualization of the idea of technology at the moment of conducting research in ET is among the reasons why the field is struggling in the production of actionable knowledge (Dron, 2022).

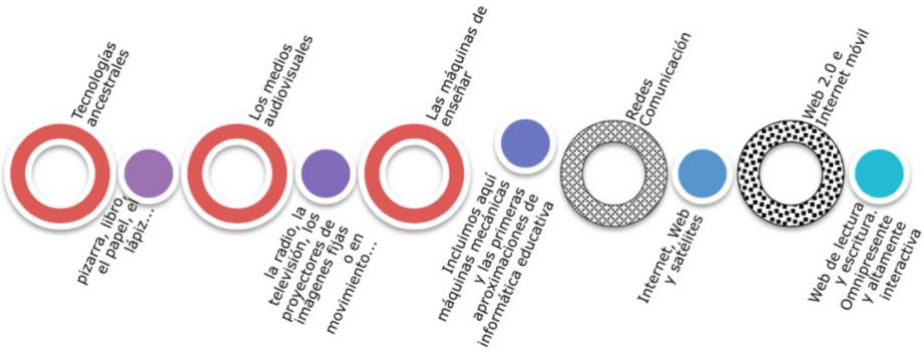
There are two other issues worth mentioning in this context, even though a detailed analysis of them goes beyond the scope of this thesis. Firstly, the lack of robust theoretical basis in ET research studies (Castañeda et al., 2020), which should be overcome by considering a dialogue with other disciplines, such as the philosophy of technology, the psychology of learning, the sociology of education, as well as other educational sciences (Secchi et al., 2023). Considered the interdisciplinary nature of this work, this first theoretical section is also aimed at partly overcoming this issue in the framework of the current study. The other aspect to be considered refers to the limitations determined by the research methodologies implemented in ET and to the negative consequences that this entails in terms of contribution to the academic development, on the one hand, and to the actual production of changes in the educational practice, on the other. This last aspect will be discussed in more details in the next section of the thesis, since it is considered fundamental to understand the methodological choices undertaken during the research study.

1.2.1 Education and Technology: the story of a complicated relationship

In order to understand the paradigmatic shift that the field of ET is living in the last years, it is useful to consider a brief overview of the ways in which, in its history, the relation between education and technology has been conceived. Looking at the past it is always useful to gain a more holistic perspective on the present and this is also true in the field of ET, as it will be clearer towards the end of this paragraph. According to an analysis conducted by (Castañeda et al., 2020), it is possible to identify five moments of the history of the relationship between technology and education, as exemplified in Figure 1.

Figure 1

A short story of technologies in education (Castañeda et al., 2020, p. 245)



According to the authors, each stage is characterized by a predominant technology or group of technologies, whose condition of use for educational purposes were strongly affected by the specific political, economic and social characteristics of the moment in which they were implemented for teaching and learning purposes. Therefore, the first stage consists of the "ancestral technologies or the prehistory of the ET" (Castañeda et al., 2020, p. 242). Examples of such technologies are black-boards, pens, pencils and printed text-books, being these the dominant technologies in the classroom which shaped teacher practices for centuries. The following stage relates to the 1940s of the XX century, when audio-visual media (like radio, TV or image projectors) were first implemented to massively teach the US armies and, later on, introduced to regular classrooms as a new and innovative teaching approach. The third stage is the one of the programmed learning, with Skinner's teaching machines (Skinner, 1958), the first computers and the first attempts to implement informatics for educational purposes. During this phase, the behavioristic and instrumentalist paradigm was, therefore, predominant. Afterwards, the mass media entered the scenario, followed by the introduction of the Internet and, finally, the break-in of the Web 2.0., with mobile devices and the possibility of a more personalized, long-life e-learning. As the authors of the timeline highlighted, a further phase should be added to the stages described so far, that is the age we are living in, characterized by the developments of AI and the introduction of emergent technologies, such as VR or AR.

The classical evolutionary approach to the history of the relationship between technology and education presented here is characterized by a deterministic perspective, where technology is conceived as the driving force that, by *being applied* to educational settings was able to *change* or *enhance* learning (Hayes, 2015). As a response to this 'technology first' attitude, in the last years a number of educators called for a 'more pedagogical' approach to the employment of educational technologies, asking "the pedagogical horse to drive the technological cart" (Sankey, 2019, p. 46). The necessity of a 'pedagogy first' approach could be considered a response to the hype of marketing and research discourse in the 'hyper technical' society and, therefore, as a result of the worries for the disruptive potential of technologies, which consequently led to the idea of a possible overinfluence of technology on education (Sankey, 2019; Tsui & Tavares, 2021).

However, contemporary positions underlined the necessity to overcome such *paradigmatic war*, from which a number of problematic issues derived in terms of educational practice and academic development (Kimmons & Johnstun, 2019). Moreover, post-digital and socio-material approaches to the study of technology underline the fact that technology does not *apply* to education, it is not *implemented* in it, nor it *improves* or *enhances* learning per se, since all this is only part of what technology is within a wider system of connections between technology and education (Fawns et al., 2021; Jandrić et al., 2018). According to Castańeda et al. (2020), placing technology as an appendix to any other process, including education, is reductionist and problematic. Therefore, according to contemporary perspectives on ET, the relationship between technology and pedagogy must be conceived as part of a complex system in complex societies, where the focus should be set on the relations among all the factors involved rather than on isolated elements (Rahm & Rahm-Skågeby, 2023; Secchi et al., 2023).

> Education is with technology, because society is with technology in the most complete sense of the post-digital […] and ignoring some aspects of education in the reflection on technology leads us to generate partial discourses and practices (Castañeda et al., 242).

A proposal able to overcome the pedagogy-technology dichotomy and to address the complexity of such relationship is the Entangled Pedagogy Model (EPM) proposed by Fawns (2022), which is adopted as the pedagogical assumption of the present study.

1.2.2 A new possibility for the struggling couple: the construction of an Entangled Pedagogy

The idea of an entangled pedagogy moves from the *paradigmatic war* (Kimmons & Johnstun, 2019) and from those positions, previously discussed, which conceptualize technology and pedagogy as two separated identities, with one of the two being considered as the force that causes some predetermined effects. The issue with considering technology as first or last in relation to pedagogy is the risk of *pedagogical* or *technological determinism*, two assumptions which underestimate the actual complexity related to the introduction of technology in a teaching and learning environment. According to the literature of the philosophy of technology (Barad, 2007; Pastena, 2020; Tsui & Tavares, 2021), both positions can be considered limited and problematic, since the focus should be shifted from the consideration of isolated elements to the multifaceted set of relations included in the teaching and learning experience. By embracing socio-material and post-digital perspectives, Fawns (2022) underlines the necessity of a holistic approach to ET, where technology is conceptualized in its *situated* nature, and where, therefore, social, cultural and a number of contextual factors are considered at the moment of its implementation for educational purposes. An EPM

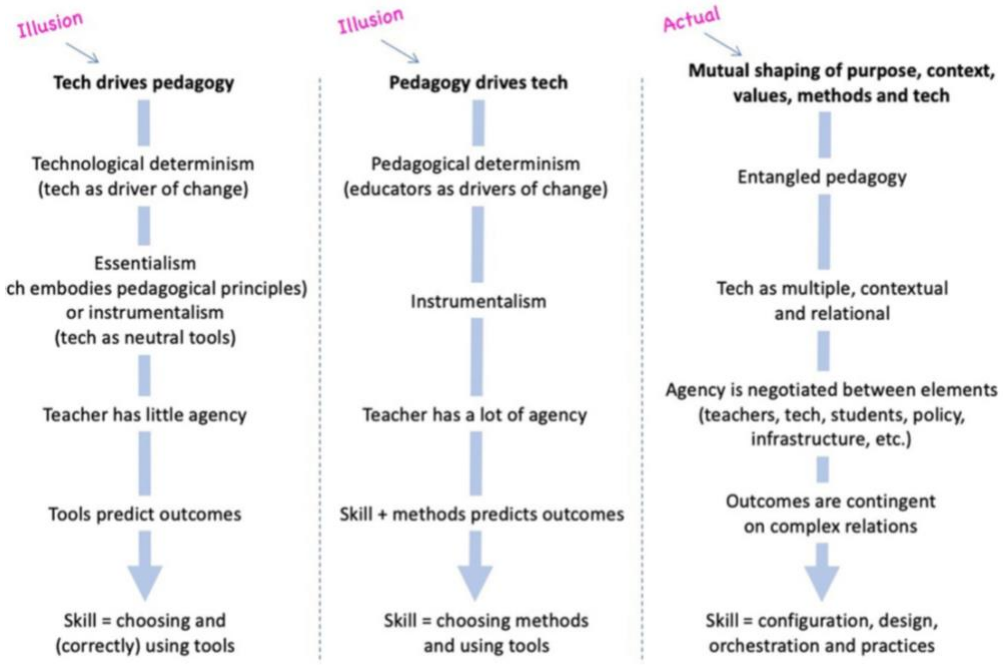
> encapsulates the mutual shaping of technology, teaching methods, purposes, values and context. Entangled pedagogy is collective, and agency is negotiated between teachers, students and other stakeholders. Outcomes are contingent on complex relations and cannot be determined in advance (Fawns, 2022, p. 711).

Differently from the views where either technology or pedagogy are conceived as the drivers of change, in the entangled model technology and pedagogy are in a continuous conversation, because the "actual education activity is always a complex

entanglement of factors, iteratively and mutually shaping each other" (Fawns, 2022, p. 714). The EPM is an effective guidance for educators to understand and reflect on technology *in use*. The implications of the introduction of technology in a teaching and learning ecosystem are undeniable and educators should be able to take the best decisions in order to better exploit its educational possibilities (Bates, 2019). However, the EPM makes a step forward, conceiving these possibilities in their *situated* social and material dimensions, and, therefore, considering the influence of policies, practices, cultures and traditions in which they are embedded (Barad, 2007; Fawns, 2022). The importance of contemplating the plethora of external factors involved in the teaching and learning ecosystem when introducing ETs is particularly relevant in the scope of the present study and it consists of a valuable reason to adopt the EP perspective as a theoretical premise for it.

Figure 2

An entangled pedagogy: views of the relationships between technology and pedagogy (Fawns, 2022, p. 713)



As it can be observed, in column 1 and 2 the scholar defines the approaches as *illusionary*. Examples of the first column are cases of technology driven educational environments, in which students' outcomes are exclusively attributed to technological capabilities (Aitken & Hayes, 2021). The second column refers to all those cases in which technology is conceived as a simple tool in the hands of educators, that lead the entire teaching and learning experience by selecting the right methods according to the tool implemented. In order to avoid the illusions of the first and the second column, teachers can be guided by the entangled model in column 3. In it, technology is incapsulated, together with methods, contexts, values and purposes, into pedagogy. This idea should not be understood as pedagogical determinism, because the agency of teachers and educational designers is only partial and outcomes do not depend entirely on their actions (Fawns, 2022). Because technology is entangled within pedagogy, it is not possible to select one or the other *a priori*, but they must be considered in their use and, therefore, in their situated practice, where results are shaped by a combination of factors in action. Teaching is not only in the hands of teachers, but it is also managed and influenced by other factors and stakeholders in a mutual effort (Dron, 2022; Fawns et al., 2021). Students reinterpret and co-design teachers' plans; information technologists design and procure platforms; administrators shape relationships between teachers and students, while policy-makers influence culture and practice. Therefore, "educational activity is emergent, and the roles of teachers and technologies are entangled within a broader conception of pedagogy, along with methods, purposes, values and context" (Fawns, 2022, p. 715).

1.2.3 The bricks of the new relationship: technology, methods, purposes, values and context in the Entangled Model

In order to better understand how the relations among all the agents in action mutually shape the teaching and learning practice, they will be separately considered afterwards. The first agent *in use* to be considered is technology. As previously discussed, in the EPM, technology is not understood as a specific object or device, but always as a

combination of multiple other technologies in use, where what matters are the relations among such technologies and the number of actors involved in the educational system, in a specific cultural and infrastructural context (Dron, 2022). Together with technologies, teaching methods are entangled in pedagogy as well. Methods can be considered as structures through which teachers and students are guided in facilitating learning. In the EPM they are understood as a form of technology themselves, which can 'materialize' specific ideas about how learning happens, implicitly (or not) conveying values to students (Dron, 2022). In a balanced educational environment, methods and values are aligned with purposes (Biesta et al., 2015). Explicitly defining values and purposes allows teachers and students not only to know what they will do and how (Fawns, 2022), but it also entails effective communication among all the stakeholders of the EPM. Moreover, purposes must be negotiated across all the agents involved. Teachers, for example, might have specific purposes related to their development or future work, while students may individually have different types of purposes according to specific learning tasks (for example, achieving a specific grade). Teachers and students' purposes should not only work mutually, but they should also be shared within the institution, which in turn might have other purposes, for example related to incomes and reputation (Fawns, 2022).

Together with purposes, values are the groundwork of the reasons why educators engage in specific decisions. Values are beliefs regarding what is considered to be relevant in a teaching and learning experience, including not only the importance of the subject taught, of the learner and the entire learning process, but also ideals, collaboration, vulnerability, standards and critical thinking (Dron, 2022; K. Lee, 2021; S.-M. Lee, 2019). Moreover, together with all the other agents of the teaching and learning experience, values are influenced (and shaped) by the development of practice and the characteristics of the context. Consequently, educators should make an effort to align their teaching practice with their values in a number of contexts which are changeable, because they are influenced by the plethora of relations among all the different agents in place (Fawns et al., 2021). Subsequently, the alignment between values and practice is not easy to achieve, because of internal reasons such as personal dispositions, beliefs, knowledge or expertise of educators, as well as because of extra personal variables related to teaching conditions, infrastructures and materials available (Biesta et al., 2015). Therefore, the possibility to put values in practice could remain only aspirational. Nevertheless, such a

possibility should be addressed as a main issue to overcome, since values inform crucial decisions regarding tasks, contents, types of assessment, methods and technologies. They are relevant in design, practice and evaluation and might, therefore, be explicitly shared and articulated (Biesta et al., 2015). Considered the relevance that values and purposes have in shaping the entire teaching and learning ecosystem according to the EPM, they were specifically addressed in this research study, as it will be seen afterwards.

Additionally, (Fawns, 2022) underlines the fact that, not only the importance of the number of relations among several factors must be considered, but also the emphasis that each stakeholder places on each of these factors. Considering this aspect, as well as the fact that the major importance in research studies tend to be placed on technology and methods, Fawns (2022) proposes an 'aspirational' view of the EPM (Figure 3), where, in order to actively engage with the complexity of the educational experience, students, teachers and other stakeholders can revisit purposes, values and context. For the sake of completeness, the aspirational view of (Fawns, 2022) is reported in the current chapter. Nevertheless, the model considered as the pedagogical ground of the entire study is reported in Figure 2, column 3.

By revisiting purposes, values and context, the agents involved will be able to actually collaborate on design and practice, consciously and meaningfully informing decisions on teaching methods and technologies. In the development of such a collaborative negotiation of agencies, teachers, students and other agents must be ready to embrace uncertainty, imperfection, openness and honesty (Fawns, 2022). Only by looking at, and reflecting on, the situated relations of entangled elements involved in the teaching and learning ecosystems, as well as on the values given by the actors of the ecosystem to each different element of it, a collective, responsive and actionable knowledge can be produced (Markauskaite et al., 2021).

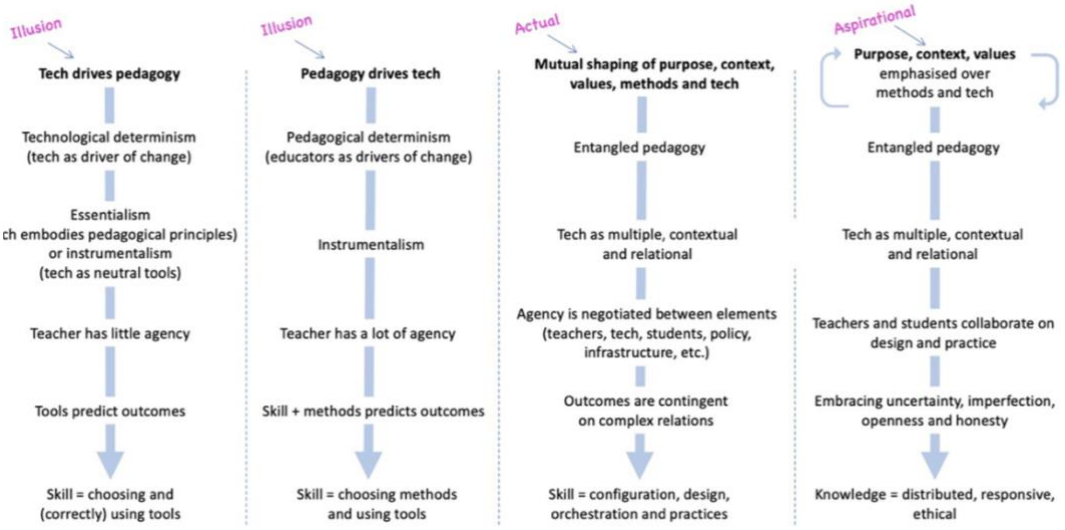
Furthermore, the construction of an actionable knowledge implies a complex analysis of the relationships among single elements, conducted by situated observation and, henceforth, based on evidence (Goodyear & Carvalho, 2019). Comparative studies based on a deterministic conception, such as online platforms vs on campus teaching, cannot be considered exhaustive in the framework of an EPM. According to this type of research studies, learning outcomes derive from a specific modality (online vs in person),

from the implementation of a technology or from the choice of a method instead of another. Therefore, instead of depicting the whole picture, they merely focus on specific elements in isolation (Jandrić et al., 2018; Knox, 2019), or just on one single element, being this the educational tool implemented, which is conceived as the pill able to make the sick person feel better. Because the philosophy behind EPM sees digital education as a social, material and embodied fact (Barad, 2007; Fawns, 2019) the focus of academic research should also be on the "relationship of technology to the situated combination of context, purposes, values and methods" (Fawns, 2022, p. 723).

A last agent of the entangled model remains to be discussed, the context, whose importance consists of another reason to consider the EPM a valuable framework for the current study. Context in the EPM is understood not only as the information in immediate focus, but also as evidence on teachers' and students' cultural backgrounds, personal and family lives, studying and economic conditions, personal motivations, domain-specific requirements, time and practical pressures, for example when scheduling is considered (Korica & Nicolini, 2019). The meso and macro educational levels are also relevant, where decisions of policymakers and administrators are undertaken (Castañeda et al., 2020; Eradze et al., 2023). However, Fawns (2022) underlines the dangers implicit in an overwide conceptualization of context, where potentially everything can be considered as being part of it. The risk connected with such an issue, again, can be limited by teacher practice. Therefore, teachers must be able to identify which elements of the micro, meso and macro level should be considered capable of influencing the context or not, in the same way in which educators decide on relevant purposes and values (Goodyear & Carvalho, 2019). However, it is relevant to consider that "What is relevant is not always knowable beforehand: context does not simply pre-exist in learning activity, it is also shaped by it" (Fawns, 2022, p. 718). As already underscored, such a conceptualization of the notion of context is valuable for the peculiarities of the social, economic and cultural context in which this research study was conducted.

Figure 3

An entangled pedagogy model, including an aspirational view (Fawns, 2022, p. 718)



1.3 Emerging from the existential crisis: towards a nuanced and extensive definition of technology

As previously underlined, the other crucial aspect to consider in the process of understanding the field and the status of ET, and therefore the pedagogical premise of the current work, is related to the necessity for a new conceptualization of technology. Fawns (2022) does not conceive technology as something fixed or homogeneous which allows educators to connect predetermined functions with an expected practice and results. Technology is neither provided by an intrinsic, immutable essence of pedagogical principles independent from human activities (essentialism) or as a set of neutral technical tools subjected to the necessities of human decisions (instrumentalism). Conversely, technology cannot be conceived as something existing a priori, because it is entangled in a number of different contexts and in each, it acquires a specific meaning, which is defined by the relations it establishes with each aspect of the system where it is in use (Bardone et al., 2023; Dron, 2022). Moreover, in trying to achieve a more nuanced definition of technology, it is fundamental not to think it in terms of a particular device,

but to conceive it as a combination of multiple other technologies in use and of the relations that it establishes with the context in which it is embedded. In other words, "technology is always more of the sum of its parts" (Fawns, 2022, p. 716).

Already scholars such as (Castañeda et al., 2020), underlined the limits that researchers and academics determined in the field of ET by implicitly adopting philosophical assumptions of essentialism or instrumentalism without explicitly conceptualizing technology in the theorical frameworks of their researches. According to (Oliver, 2011), the way in which technology is conceived at the moment of conducting a research study will determine all the decisions that will be undertaken during the entire research process. He describes six categories through which technologies can be conceptualized. In the first, technology is conceived as a cause. Therefore, in this first group it will be possible to find research studies based on affordances and perception about technology, as well as research on the intrinsic properties of technological artifacts. The second category sees technology as a social intervention and it contains all those studies focused on the efficiency and the effects of technology on social activity (if it favors, trains, allows or restricts it). In the third definition, technology is conceived as a social effect. This conception of technology groups the number of studies that investigate whether society impacts technological development and in which manners and contexts does this impact happen. The fourth possible category conceives technology as the mean to inform theory through design (as in the case of design-based research), while in the fifth possible definition, technology is intended as a network effect focused on the understanding of the materiality of social practice (as in the case of socio-material discourses). Finally, the sixth category conceives technology as a system embedded in other systems.

Therefore, technology it is not *a* part of the social system, but it is a system itself which works within each particular context of the wider social system. It is not possible to understand technology in an objective, established, causal or essentialist, manner, but in relation to specific, situated and concrete teaching and learning practices. Henceforth, technology does not lend itself to monolithic, causal or essentialist explanations of reality, but it must be understood in situated and concrete cases (Castañeda et al., 2020). Considered all the arguments discussed so far, as well as the purposes, the context and

the pedagogical and epistemological assumptions of the research conducted, this last conceptualization of technology is clearly the one adopted in the context of the present study.

1.4 New identity, new relationship, new protagonists: Emergent Technologies

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. Being AR the technology implemented for the present study, before considering it in more details, an analysis of the wider context of emergent technologies in which it is included is briefly conducted. In 2020, the Horizon report changed the title of the section 'Developments in Educational Technologies' of the teaching and learning edition in 'Emergent Technologies and Practices'. The decision was undertaken because the previous title was considered to focus too narrowly on the technology[2]. Henceforth, as in the EP model, the Educause 2020 was already suggesting a perspective according to which it is not the technology per se to *impact* learning, but the scaffolded embedding of it in a teaching and learning environment, in order to support learning. The paradigmatic shift was already visible in previous editions, which included developments such as MOOCs (2013) or mobile learning (2017). Such a conceptualization of emergent technologies does not only include practices, but it underlines the connection between technology and pedagogy, which is considered as the theoretical assumption starting from which a detailed analysis of a teaching and learning environment should be conducted.

Regarding the definition of emergent technologies in relation to the educational field, already (Veletsianos, 2016) suggested that emergent technologies can be considered as tools, concepts, innovations and developments implemented in a number of educational environments for educational purposes. Moreover, the scholar underlines some issues related to emergent technologies; Firstly, the fact that their appearance is

[2] https://library.educause.edu/resources/2020/3/2020-educause-horizon-report-teaching-and-learning-edition

characterized by a moment of over-expectation. Secondly, the potential disruptiveness of them and, consequently, the necessity to investigate them at the moment of their appearance in the educational field, in order to understand their actual potential at the moment of their introduction in a teaching-and-learning ecosystem. Together with the potential downsides of emergent technologies, their possible advantages should be considered as well. Emergent technologies enable a dynamic, open, creative and innovative transformation of the context in which they are implemented. They develop new scenarios by creating new ways of dealing with information. Ubiquitous and spatial learning are supported and, as in the case of AR, they allow to integrate digital information in the physical world (Díaz Fernández, 2020).

However, and specifically for the educational environment, they require new agents, as well as a new set of skills and competences to meaningfully exploit their potential. Therefore, more research is necessary, considering also the fact that they are usually designed for economic and commercial uses and only later implemented for educational purposes. Moreover, even in those cases in which technologies are designed for educational purposes, they are still not very meaningful to teachers or relevant for innovation, because they are implemented by simply repeating existing practices with new tools. Consequently, educational institutions have to deal with issues related to an actual understanding of the potential of emergent technologies from teachers and educators, which means that they must be educated, trained and supported in the processes of implementing such technologies in the classroom. Together with the issue of teacher education and agency, the problems related to the type of infrastructures available must be considered as well. Furthermore, the rapid change of the characteristics of emergent technologies makes the possibility to overcome such issues even more complicated (Díaz Fernández, 2020).

All these aspects are fundamental when considering the introduction of an emergent technology in a teaching-and-learning environment and more research is needed in order to overcome them. Because they consists of the major gaps in the literature of the current study, they are further discussed in the next paragraphs, specifically in relation to AR and to its implementation for language education through mobile devices.

2 MOBILE AUGMENTED REALITY, WHAT IS IT?

2.1 Mobile Assisted Language Learning

The ubiquity of the Internet and the pervasiveness of mobile devices such as smartphones or tablets made technologies such as VR or AR more affordable and accessible than ever before. “Smartphones, for many of us, have indeed become an extension of ourselves something like a digital appendage” (Godwin-Jones, 2016, p.3). A field concerned with the consequences of the introduction of mobile technologies in language education, is Mobile Assisted Language Learning (MALL). According to (Pegrum, 2021), MALL research is concerned with three types of mobility: the mobility of the content, the mobility of the device and the mobility of the learner. These three kinds of mobility continuously blend, with the focus remaining mainly on the mobility of the learner, as in the case of the present study. The term MALL refers to “mobile technologies in language learning, especially in situations where device portability offers specific advantages” (Kukulska-Hulme, 2012). Considering this definition, as well as the aims of the study and the fact that AR can be experienced through a mobile device in order to access the digital experience, AR can be considered a category of mobile learning (Zhang et al., 2020) and indicated as Mobile Augmented Reality (MAR). Consequently, when implemented for language education, MAR can be included in the scope of MALL, which enables the continuity of access and interaction across various language learning contexts (Morgana & Kukulska-Hulme, 2021).

In the last twenty years, MALL has developed rapidly, with educators and researchers conducting studies in order to promote the implementation of mobile technologies in language education and to understand the nature of the relations of these technologies with second language teaching and learning (Pérez-Paredes & Zhang, 2022; Rosell-Aguilar, 2017). In the cases in which smartphones and tablets are not simply conceived as digital substitutes of books’ and papers’ contents, a mobile approach to language teaching and learning can support students’ education by transforming the way in which learning is conceptualized and experienced in the scope of the classroom (W. Wu et al., 2011; Zhang et al., 2020).

Nowadays, with more people relying on smartphones to access the Internet, open access Wi-Fi networks are available in a large number of developing countries (Godwin-Jones, 2016). The advantages that the ubiquity of the internet entails for MALL are several. Students can communicate and collaborate with their peers through a number of interactive activities, such as the creation of videos or the collaborative comprehension of oral and written texts. They can record themselves and share their works with classmates and teachers, both in presence or online (Morgana & Kukulska-Hulme, 2021).

The possibility to work in an interactive, collaborative environment has the potential to increase creativity and communication skills, due to the creation of a more authentic context that is "[…] aligned with people's positive everyday experiences of smartphone use […]" (Morgana & Kukulska-Hulme, 2021, p. 126). In this sense, MALL is creating the conditions to cross the boundaries between formal and informal learning, with studies demonstrating "how everyday personal technologies can be used as part of formal or semi-formal learning" (Morgana & Kukulska-Hulme, 2021, p. 126). Another advantage of MALL is related to the sense of enjoyment and to the perception of personal gains that students can experience in a mobile environment. However, together with the need for more research on the connection of mobile approaches with actual learning outcomes, studies on the affective dimensions of teachers and students in MALL environments are imperative,

> […] especially if we adopt the position that favourable learning experiences contribute to the formation of positive attitudes towards education or language learning, that may in turn influence whether people choose to continue learning beyond their current level and in their future jobs (Morgana & Kukulska-Hulme, 2021, p. 126) .

Despite the plethora of advantages discussed so far, there are few limitations to the field of MALL, mainly related to the issues which can arise when considering the differences among a number of economic, social and cultural contexts (Fawns, 2022; Morgana & Kukulska-Hulme, 2021). Globally, a significant number of educational organizations still has severe restrictions on bringing personal devices or on using them in the classroom. In many cases, providing students with institutional mobile devices can be too expensive. A possible solution to this issue could be the adaptation of BYOD

(Bring Your Own Device) practices in the school curriculum, however the risks to highlight economic differences among students, institutions and countries is high (Morgana & Kukulska-Hulme, 2021).

Other limitations are related to the gaps open for further research in MALL, which are here addressed because of their relevance for the purposes of the study. Firstly, the majority of studies in MALL have focussed mainly on English as a second language and on adult learners, while the implementation of mobile technologies among learners aged between 13 and 17 years is very much underexplored (Kukulska-Hulme & Morgana, 2021). Therefore, this study aims to implement MAR activities with adolescent students of Italian Language (IL) in secondary schools. Moreover, research on the modalities in which specific features of mobile devices can offer different affordances to specific language education settings is still at an early stage.

However, the crucial gap for the present study is related to the role of educators. In MALL practices teachers should be prepared to design and implement interactive and collaborative activities for learners (Pérez-Paredes & Zhang, 2022). However, teacher training and roles in MALL approaches are issues which require further investigation, as it will be specifically addressed in the next paragraph. A last aspect to be considered is the one strictly related to the possible negative consequences of implementing mobile devices in the classroom. More research is needed in order to identify the challenges that personal smartphone use in the classroom could enable, especially for the novelty of the phenomenon (Metruk, 2022). With the aim of contributing to address the gaps in the literature of MALL discussed so far, the present study focussed on teachers' perspective on the experience of MAR contextualization for the ILTAL. In order to better contextualize the study, it is necessary to narrow the focus on AR, describing the emergent technology, considering its features in the context of language education, as well as the main gaps related to its implementation in second language teaching-and-learning environments.

2.2 Augmented Reality

Augmented Reality is a technology which, by pointing a mobile device camera to an object, to a Quick Response (QR) code or to a specific place, enables the superimposition of virtual graphics and media over the physical environment (Scrivner et al., 2016), exposing the user to virtual contents like video, 3D pictures, maps, audio files or animations. Nowadays, AR has plenty of applications in a number of fields, including commercial games, advertisements, education and entertainment applications. Many companies have integrated AR to advertise their products and to provide a better service to their customers. Industries such as Nissan, Toyota and BMW integrated AR technologies to provide their customers with the experience of a 3D view of their cars. Movies such as *Iron Man*, *Transformers* and *Star Wars* have been advertised by implementing AR technologies; Lego uses AR to show costumers an animated version of Lego toys and Disney World integrated AR to make their guests' experience more exciting by adding virtual elements to the park. Recently, this technology entered the world of education as well, presenting a plethora of advantages in a number of different disciplines in terms of engagement, interactivity and learning outcomes (Parmaxi & Demetriou, 2020; Taşkıran, 2019). However, its implementation in the field of language learning is at an early stage and a number of gaps still need to be addressed in order to fully understand how to successfully integrate this technology in the language classroom. Before addressing the issues that are relevant in the scope of this literature review, a definition of AR is considered, as well as its history and a description of the different existing types.

2.2.1 Definitions

Although a number of sources considers the beginning of the 20th century as the starting point of the AR history, and even though several ancient precursors of AR could be identified as it will be seen afterwards, the term augmented reality was coined for the first time by Tom Caudell and David Mizell in 1992. The two Boing engineers invented the

term referring to a see-through headset they were developing for the aeronautic industry. In their article the scholars described

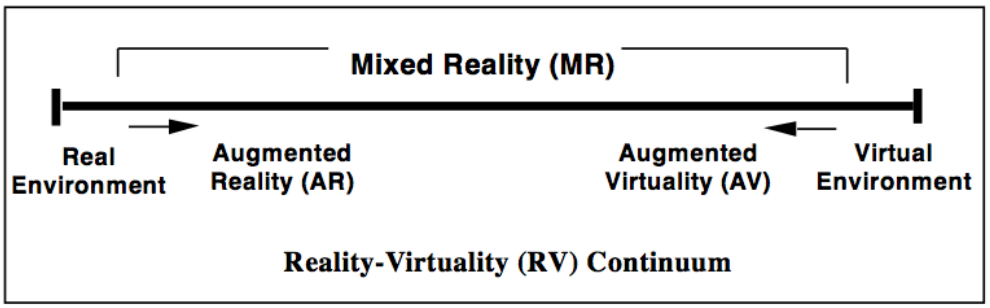
> the design and prototyping steps we have taken toward the implementation of a heads-up, see-through, head-mounted display (HUDSET). Combined with head position sensing and a real world registration system, this technology allows a computer-produced diagram to be superimposed and stabilized on a specific position on a real-world object' (Caudell & Mizell, 1992, p. 659).

According to them, the goal of AR was to enable cost reductions and efficiency improvements in many of the human involved operations in aircraft manufacturing. The definition was elaborated by other scholars afterwards. Azuma (1997) described AR as a technology which enables the integration of computer-generated virtual objects into the real world. Carmigniani & Furht (2011), defined AR as a real-time direct or indirect view of the physical environment enhanced by adding virtual computer generated information to it. Moreover, the scholars underscored that similarly to VR, AR can be experienced through headsets and glasses, but also through mobile devices such as smartphones or tablets.

As emphasized in the aforementioned definitions, AR is essentially described in comparison to her technological cousin, VR. Understanding the type of connection between the two technologies and the nature of the association that they establish with the real environment is crucial for their characterisation. This connection was conceptualised for the first time by Milgram & Kishino (1994), who highlighted the fact that AR and VR are related and, therefore, it is valid to consider the two concepts together (Skarbez et al., 2021). Starting from this assumption, they discussed 'how AR can be regarded in terms of a continuum relating purely virtual environments to purely real environments' (Milgram & Kishino, 1994, p. 282), underling the fact that in the scale between these two settings, AR is collocated towards the 'real environment' end of the spectrum, as visible in Figure 4.

Figure 4

Simplified representation of a RV continuum (Milgram & Kishino, 1994, p. 283)



Therefore, the Reality-Virtuality continuum permitted to affirm that the main difference between virtual and augmented reality consists of the capability of AR to maintain a connection with the real world, enabling the user to move in the physical space during the AR experience.

> AR interfaces allow users to see the real world at the same time as virtual imagery attached to real locations and objects... AR interfaces enhance the real-world experience, unlike other computer interfaces that draw users away from the real world and onto the screen (Billinghurst & Duenser, 2012, p. 2).

This characteristic of AR allowed it to be suitable for language education, particularly when it is implemented through mobile devices. Through mobile AR, students can move around a physical space they already know, but which is enriched by overlaying virtual texts, videos, animations or audios to it in order to create an enhanced scenario. Therefore, learners are able to interact with an *augmented* input in a teaching and learning context enriched by a number of different inputs. Considering the definitions of AR presented in this paragraph and the issues addressed so far, the author of this study developed the following definition, which is considered to be relevant in the scope of this research and in the field of language education in general: AR is a technology that allows the creation of an interactive scenario by adding virtual contents into the real world, enabling learners to interact with an enhanced input in a meaningful context.

2.2.2 History

A particularly interesting fact regarding the history of AR is underlined in the scope of this review, also because of the relations it has with the origins of the author of this study. According to the scholars who worked on the Augmented Reality Teaching Book[3], an open source material developed in the scope of the Erasmus+ project AR-4-EU for the teaching of AR in higher education, the first idea of the possibility to see in a room things that are not actually there came from an Italian. Giovanni Battista Della Porta was a man of science, an alchemist, a philosopher, a mathematician who lived in Naples in the years of the scientific revolution and of the Protestant reform. Before Galilei, he wrote a small treatise *De Telescopio*, in which he described the phases for the construction of the instrument (Eco & Fedriga, 2014). He was a passionate of mathematics, astrology, alchemy, natural and occult philosophy and he was also called 'Professor of Secrets', because he founded the first 'Academy of Secrets' in Europe (Piccari, 2007). In his main work, *Magiae Naturalis* published in 1584, Della Porta describes the idea of a glass panel in a room, positioned in a manner that allows light to bounce from several objects in a different position. In this way, the illusion is created and the objects reflected seem to be collocated somewhere else than they actually are (Santoro, 2016). This same principle of reflection from a semi-transparent mirror is basically at the basis of the contemporary AR head-mounted displays.

However, the history of AR is not only related to science, alchemy and philosophy, but also to the world of the theatre. John Henry Pepper and Henry Dircks invented the *Pepper's ghost* in 1862[4]. As it can be observed in Figure 6, *Pepper's Ghost* consists of an illusion which allows the audience to see floating ghost objects on the stage. The trick was created thanks to the presence of an additional room under the stage (the 'blue room'), hidden from the audience, from which an image was projected and reflected on a glass on the stage positioned at a 45-degree angle. The same technique is still at the

[3] https://codereality.net/ar-for-eu-book/

[4] https://codereality.net/ar-for-eu-book/

basis of modern plays which project AR contents, even though with short-throw projectors and the necessity of less space.

Figure 5

A representation of the Pepper's Ghost

Della Porta with his ideas in the *Magiae Naturalis,* as well as Pepper and Dircks with the intuition of the *Pepper's Ghost* can be considered ancient precursors of AR. Afterwards, the idea of superimposing graphics elements to the real environment by projecting them on a glass, started to be implemented in the military context. In the 1950s, first head-up (HUDs) displays started to appear for pilots of fighter planes. By projecting information directly to the field of view of pilots, they were no more required to look down at the instruments. From there the name 'head-up' displays (instead of 'head-down').

However, the year zero of AR can be traced back to the 1960s, with the seminal work of Sutherland. In 1968, Ivan Sutherland created the first AR and VR system in history, called 'The Sword of Damocles' (Almoosa, 2018, p. 22). It consisted of a digital system whose prototype was so heavy that it required a mechanical arm suspended from the ceiling in order to support it (see Figure 6). It was the world's first head-mounted display including head tracking and see-through optics.

Figure 6

The sword of Damocles (Almoosa, 2018, p. 22)

During the 1970s and the 1980s AR started to develop as an independent research domain, also in the field of art. A number of artists experimented forms of interaction between humans and computer generated contents. Particularly, Myron Krueger (1975), created his 'Videoplace' installations, where participants' silhouettes collaboratively interacted with graphical overlays shaping the actual installation by the creation of a virtual world made of human-graphic interactions projected on the screen (Figure 7).

Figure 7

A picture of Videoplace (Almoosa, 2018, p. 22)

As already discussed above in the paragraph, the 1992 marked the birth of the term 'Augmented Reality', with the first immersive AR system by Tom Caudell and David Mizell (1992). Since then, the use of AR was mainly relegated to aircraft engineering and surgical training, due to the expensive costs of the sophisticated devices that the technology required for its implementation (Parmaxi & Demetriou, 2020). In 1994, Azuma, a leader researcher in AR, developed a marker-based tracking technology connected to a motion stabilized display for outdoor use. Around the same years, Steve Mann and his group at the Massachusetts Institute of Technology (MIT) media laboratory, started to explore and experiment wearable technologies and mediated reality. However, the first outdoor AR system was the Touring Machine, which appeared in 1997 and only two years later the first open source AR tracking library, the ARToolKit, was released on the market (Almoosa, 2018).

The following step did not have to wait long and in 2007, the first mobile AR application was created on a Nokia smartphone (Kipper & Rampolla, 2013). In 2008, location-based AR experiences started to appear with GPS based applications. Tools able to create AR experiences using web technologies started to appear one after the other, such as Layar or Argon (Kipper & Rampolla, 2013). The technological advances that we have witnessed in the last decade favoured the development of AR applications for the consumer market, making the technology more economic and available for everyday mobile devices like smartphones or tablets (Parmaxi & Demetriou, 2020). Wearable devices such as smart glasses started to appear on the market, even though with elevated costs. In 2011, for example, the first smart glasses were developed by Google and in 2014 Meta One developed and sold the first high quality AR headset, observable in Figure 8, which was retrieved from the aforementioned electronic book on AR history[5].

[5] https://codereality.net/ar-for-eu-book/

Figure 8

Meta One headset

2015 was the year of Vuforia, a Software Development Kit (SDK) which allows to create AR contents for mobile devices. In the same year, the Hololens 1 appeared. It was the first headset device with a Window 10 software incorporated. One year later, a competitor of the HoloLens appeared: the Magic Leap One. In 2017, the first AR platform for IOS devices was released (ARKit). In the same year, Google launches his own platform to develop AR experiences for Android devices (Almoosa, 2018). Starting from 2019, Microsoft Hololens 2 started to be sold. Nowadays, smart AR sun glasses able to overlay AI data on the real world can be acquired online, such as the Everysight developed by Maverik[6] or the Solos smart glasses[7].

The quick developments of the technology allowed AR to easily enter the world of education and, specifically, the field of language teaching and learning (Pegrum, 2021). Before considering the main advantages and disadvantages of the introduction of AR in language education, a quick overview of the currently available types of AR is provided, since it is considered fundamental to understand the characteristics of the AR Studio platform implemented for this study. As a conclusion to this paragraph, a timeline of the main developments of AR is presented in Figure 9.

[6] https://www.everysight.com/

[7] https://solosglasses.com/

Figure 9

A timeline of the main developments of AR[8]

2.2.3 Types of AR

As previously explained in relation to the Reality-Virtuality Continuum (Skarbez et al., 2021), the main feature of AR consists of its ability to maintain a link with the physical world, augmenting its experience through the overlaying of virtual elements on it.

> Since the presence of the physical world is a constant in AR, the variation in experience depends on two things; the nature of the virtual content and the level of linkage between that virtual content and the background view of the physical world (MacCallum & Parsons, 2019, p. 22).

Therefore, a first categorization of AR depends on the type of software, hardware and support which are used for the creation of the virtual content. A distinction can be made between AR tools that require specific hardware, such as the *Hololens*, and mobile-based AR, that simply requires a smart handheld device able to run an AR app. Moreover, as MacCallum & Parsons (2019) highlighted, another distinction should be conducted considering the way in which the AR experiences are created. They can be directly developed on a mobile device or they can be created with a software on other devices,

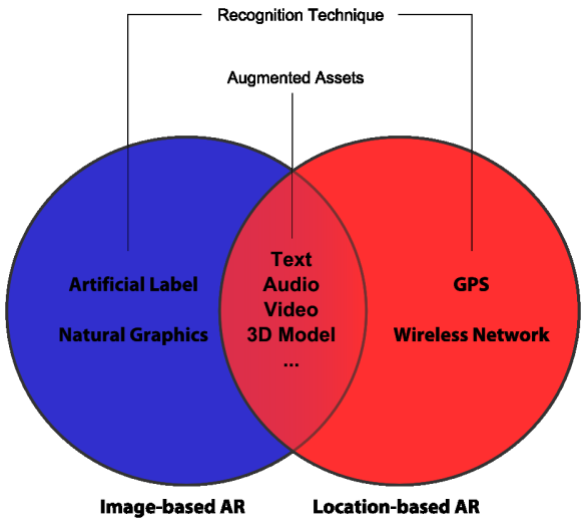
[8] https://codereality.net/ar-for-eu-book/

enabling the experience to be accessed afterwards through smartphones and tablets, as in the case of this study.

Another important difference in the types of AR consists of the nature of the link between virtual contents and the surrounding physical world (MacCallum et al., 2017). According to this parameter, the two existing types of AR are location-based and image-based AR. Location-based AR applications rely on Global Positioning System (GPS) to select and display digital location-relevant information. This type of AR is implemented to modify the navigation of a specific location by adding multimedia information to it, such as text, audio, video and 3D objects. On the other hand, image-based AR applications applies image recognition algorithms to trigger the display of virtual contents over a recognized physical pattern (Tobar-Muñoz et al., 2017). This type of AR is divided into two more categories: marker-based and marker-less tracking (Khoshnevisan, 2021). In the first case, the virtual content is added to the surrounding world through specific physical triggers, such as a Quick Response (QR) code or a defined image, as in the case of the software implemented for this study. Differently, the marker-less tracking requires no such labels, enabling any part of the real environment to trigger the virtual contents. A comparison between location-based and image-based AR is resumed in Figure 10, extracted from the work of Cheng & Tsai (2012, p. 453).

Figure 10

A comparison of image-based and location-based AR (Cheng & Tsai, 2012, p. 453).



The last aspect to be considered in order to provide a comprehensive description of the different types of AR is the level of interactivity of the virtual overlays. The virtual content which can be added to a specific environment can include text, 2D and 3D images, audio files, videos or other digital artefacts. These overlays may simply be viewed or may enable several types of interactive experiences. For example, highly interactive AR experiences allow the users to experience sensory immersion, navigation and manipulation, which promote engagement and motivation by fostering feelings of presence (Parmaxi & Demetriou, 2020).

The AR platform implemented for this study does not allow this high level of interaction with the virtual content. It is a marker-based MAR tool with a studio software for the creation of the AR experiences, and a related mobile Application (App), which allows the user to access the experience through an artificial label (QR codes). The App is available both for Android and iOS devices. More specific features of the MAR tool implemented for the study will be presented in the methodology section of the thesis.

2.3 Mobile Augmented Reality in Education

The pervasiveness of smartphones, tablets and other handheld devices provided a larger base of potential users of AR (Pellas et al., 2019), allowing this technology to enter the school classroom. A number of studies demonstrated that the implementation of AR in educational contexts offers numerous advantages. It can increase student motivation and engagement (Taşkıran, 2019), as well as collaboration among stakeholders and memorization of contents (Khoshnevisan, 2021). The use of AR in classroom seems to influence learning outcomes (J. Lee, 2022) and to positively affect the entire learning process (Cipresso et al., 2018; Pastena, 2020; Pegrum, 2021). Another main advantage of AR is its capability to promote student-centred learning and creativity (Khoshnevisan, 2021; Lai-Chong Law, 2021). Furthermore, AR increases content understanding and improves long-term memory retention, it enables ubiquitous, collaborative and situated learning, fostering learners' senses of presence, immediacy and immersion, thus linking formal and informal learning environments (Bower et al., 2014; J. Lee, 2022). AR can

enhance spatial knowledge representations and promote positive psychological states such as motivation, flow, cognitive benefits, and sense of presence. Moreover, through the blending of virtual and physical elements, AR permits to create hybrid learning environments, which can facilitate the development of skills such as critical thinking and problem solving (W. V. Wu et al., 2011; Zhang et al., 2020).

The implementation of AR across a range of educational contexts, such as microbiology, mathematics or environmental science, as well as in the humanities, allowed to demonstrate the number of advantages here presented. Nevertheless, its implementation for second language teaching-and-learning is still limited and it requires further investigation (Parmaxi & Demetriou, 2020; Pérez-Paredes & Zhang, 2022). In this regard, (Ashley-Welbeck & Vlachopoulos, 2020, p. 117) highlighted that:

> [...] there is little literature to inform teachers [...]. It is only by piecing together the fragmented, empirical works, that one is able to gain a picture of what the challenges, benefits, and discussions are surrounding it.

This need for more research on AR implementation in the field of foreign language teaching-and-learning, as well as the number of related gaps that will be addressed in the following paragraphs, represent the main rationale for the present study.

2.4 Mobile Augmented Reality in Language Learning and the issue of Teacher Training

Even though MAR has not been implemented largely for language education, some studies demonstrated the potential advantages of the integration of AR for language teaching and learning. In their review study, for example, Parmaxi & Demetriou (2020) found a number of researches demonstrating the potential of MAR in supporting the acquisition of vocabulary (23.9%), reading (12.7%), speaking (9.9%), writing (8.5%) and generic language skills (9.9%). AR engages beginner, intermediate and advanced-level language learners, it increases learners' active interaction with learning materials by improving motivation, enjoyment and relationships with peers, it provides opportunities to participate in authentic activities in semi-realistic contexts, as well as encouraging out-

of-class language use, providing a contextual and immersive learning experience for learners (Zhang et al., 2020). Furthermore, the shift from classroom setting to out-of-class language learning represents a meaningful change able to make learning more exciting (Pegrum, 2021).

Through MAR experiences, learners have the possibility to use the language in a spontaneous way while 'in most classroom settings, students lack the opportunity to step out of their comfort zone and speak on the spot' (Zhang et al., 2020, p. 128). In the case of MAR activities that extend outside formal learning settings, AR provides opportunities to negotiate and collaborate with peers and strangers in the social context, enabling learners to apply the language they are learning in real, meaningful situations (J. Lee, 2022; S.-M. Lee, 2019; Taşkıran, 2019). Overall, it can be stated that studies which examined the feasibility of AR in language education have demonstrated positive consequences of the implementation of this technology. However, despite the number of affordances previously described, to the date there are still a number of gaps that need to be addressed, mainly due to the novelty of the entrance of this technology in language education (J. Lee, 2022).

One major gap in the literature of MAR in language learning regards the role of teachers. The ubiquity and the accessibility of technologies like VR and AR offers to educators a plethora of opportunities to create linguistically and culturally authentic domains (Almoosa, 2018). AR enables teachers to create different scenarios, embedding a number of input within a real world context. However, the role of the educators as designers and facilitators is still a critical factor (Ashley-Welbeck & Vlachopoulos, 2020; MacCallum et al., 2017).

> One of the major drawbacks of AR-infused studies is that educators are predominantly unfamiliar with emerging technologies such as AR and it is unlikely to have learning gains (Khoshnevisan & Le, 2019, p. 72).

In many cases, teachers do not possess sufficient knowledge of the technology, they are not equipped with the technical expertise associated with the design of materials (Parmaxi & Demetriou, 2020; Zhang et al., 2020) and they are not trained to deal with possible technical issues that could arise when AR is implemented in the classroom. The issue was already highlighted in 2014, when Bower underscored that

> It is crucial that educators become equipped with skills to integrate Augmented Reality into their classes in order to avoid the situation where Augmented Reality learning design is primarily undertaken by information technology professionals with limited understanding of effective pedagogy (Bower et al., 2014, p. 7).

In 2020, Zhang et al. (2020) considered this aspect, emphasizing the fact that the design of AR language learning environments should not be only a professional designer's responsibility and that

> Instructors, especially those who are tech-savvy, 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, p. 230).

The lack of training for teachers is thus a fundamental issue of AR in language education, since it is crucial to support an effective contextualization of the technology in classroom, especially if we consider it from an entangled pedagogy perspective. In order to address this gap, the present study focused on IL teachers' values and purposes development during the experience of designing and contextualizing MAR activities with an online authoring tool. Through the identification of the main challenges and opportunities that teachers encounter when they design and implement MAR activities, this study aims to understand teachers' needs *in action* and to deep our understanding on how successfully contextualize this technology in the language classroom, since

> [teachers] are the ones who will prepare the activity settings. Again, this is an issue that needs further investigation, as most teachers do not have the background and/or training to respond to such tasks (Parmaxi & Demetriou, 2020, p. 12).

Nevertheless, there are several issues to consider when thinking about introducing AR in a teaching and learning ecosystem. The costs of AR implementation can be high (Khoshnevisan & Le, 2019; Wu et al., 2020), due to the necessity of equipping students with handheld devices, to provide schools with AR software and specialists, or to organize training for teachers. Moreover, these issues may have social, economic and cultural consequences. In the case of the current study, for example, the Argentinian schools where the research was conducted had technological resources limited if compared to

other countries, as it will be further discussed in the methodology section of the thesis. However, the pervasiveness of smartphones and the ubiquity of the internet enable teachers to use mobile devices as learning tools without necessarily rely on schools' economies, allowing to overcome possible issues related to the availability of handheld devices or internet access. Besides, the majority of software employed for research studies in AR for language teaching and learning are mobile-based, due to the growing availability of open-source AR apps, as presented in Table 1 (Parmaxi & Demetriou, 2020, p. 5). Therefore, the present study used an open-source authoring tool, code-free, accessible from personal mobile devices, whose characteristics were considered to be suitable for language education in a context with limited economic and technological resources.

Table 1

The distribution of different devices and software used for the implementation of AR (Parmaxi & Demetriou, 2020, p. 5)

Device	Software	# of manuscripts	Total # of manuscripts	%
Mobile-based AR	Vuforia	7	34	63
	HP Reveal (Aurasma)	6		
	ARIS	3		
	Wikitude SDK and Android SDK	2		
	ChronoOps	2		
	Layar (part of Blippar)	1		
	Pokemon go	1		
	Xcode, Facebook SDK 3.0 and ARtoolkit	1		
	Not defined	11		
Wearable device	Vuforia	2	6	11
	Not defined	4		
Computer-based AR	Multiple software	2	4	7
	BuildAR Pro 2	1		
	Unity with ARTookit	1		
Combination of devices	Vuforia	2	4	7
	Unity 3D, Blender 2.69	1		
	Not defined	1		
Computer and projector augmenting 3D model	Makey makey, Scratch	1	2	4
	Not defined	1		
Computer and projector	Not defined	2	2	4
Not defined	Not defined	2	2	4
Total			54	100

One last issue is worth mentioning in this context. MacCallum and Parsons (2019)

underscored the fact that the value of AR for language education does not only depend on the technical confidence that teachers have in their ability to integrate it in the classroom, but also on their ability to understand the relation with possible learning outcomes of such implementation. Therefore, as for the Entangled Pedagogy perspective, AR should be conceived by teachers as 'a tool for learning and not the learning itself' (Welbeck & Vlachopoulos, 2020, p. 132). It is fundamental for teachers to reflect not only on the technical or pedagogical implications of AR implementation, but to understand that both technology and pedagogy are part of the complex language and teaching ecosystem, where they should work mutually and in relation to the number of other agents involved in the educational process. Teachers should be trained not only on technical aspects of AR, but they should also be supported during the process of reflecting on the fact that the focus is neither on the technology or on learning outcomes separately, but that learning achievements will be shaped by the interaction of technology and pedagogy *in action*.

Further gaps in the field of AR in language education regards aspects such as the educational contexts in which the technology is applied and the languages explored. AR has not been widely adopted in secondary level in language education and there are still several issues to investigate in this field, as showed in Table 2 (Parmaxi & Demetriou, 2020, p. 6). Because of this reason, the present study was conducted across several secondary schools in Argentina. Regarding the target languages, English and Chinese are the most explored, and although less commonly taught languages such as Turkish or Japanese are also being investigated (Parmaxi & Demetriou 2020), the use of AR for language education is still very limited, as can be observed in Table 3.

Table 2

The distribution of educational institutions where AR empirical researches have been conducted (Parmaxi & Demetriou, 2020, p. 6).

Educational institution	# of manuscripts	%
Tertiary education	21	39
Primary education	19	35
Preschool education	5	9
Secondary education	4	7
Laboratory setting	3	6
Not defined	2	4
Total	54	100

Table 3

The target languages investigated in the AR empirical research (Parmaxi, Demetriou, 2020, p. 6)

Target language	# of manuscripts	%
English as an L1 (mother tongue) or L2 (second/foreign language)	34	63
Chinese as an L1 (mother tongue) or L2 (second/foreign language)	8	14
Sign language	4	7
Turkish as a mother tongue	1	2
Hakka culture	1	2
French as a second language	1	2
Quechua language	1	2
English and pokemon languages	1	2
Basque language	1	2
Japanese as a foreign language	1	2
Mayo language	1	2
Total	54	100

3. TEACHERS' VALUES AND PURPOSES IN ACTION

3.1 The relevance of teachers' values and purposes in action

As largely discussed, according to the EP perspective, educational activity is emergent and should be conceived in its situated social and material dimensions. The roles of teachers, technologies, students and other stakeholders are entangled within a broader conception of pedagogy, together with methods, purposes, values and context. Moreover, a consideration of the influence of policies, cultures and traditions in which the teaching and learning practice is embedded it is necessary when investigating the integration of technology in a teaching and learning ecosystem (Fawns, 2022). However, among all the factors to be considered, educators' purposes and values are the basis of the reasons why specific decisions regarding the teaching and learning experience are undertaken (Dron, 2022; Fawns, 2022; S.-M. Lee, 2019).

Explicitly defining values and purposes enables effective communication among all the stakeholders and allows a clear definition of learning objectives and of the processes through which they will be pursued (Fawns, 2022). Consequently, educators should align their teaching practice with their values, considering how these shape (and are shaped by) the characteristics of each specific teaching and learning context, as well as by the features of the relations among the agents involved. Subsequently, pursuing the alignment between values and practice it is not an easy task to achieve, not only because of external factors, such as infrastructures or materials available, but also because of variables such as personal dispositions, beliefs, knowledge or expertise of educators (Fawns, 2022). The possibility to put values into practice and the plethora of related issues should be the focus of studies on ETs, since values are crucial in informing decisions on tasks, contents, methods and technologies. Moreover, investigating the situated values given by the actors of a teaching-and-learning environment to the relations among the elements entangled in it, enables the development of a collective and actionable knowledge in the field of ET (Dron, 2022; Markauskaite et al., 2021).

Considering the issues just resumed and largely discussed in the first paragraph, the current study focuses on teachers' perspective by observing the values and purposes which they attribute to MAR during the process of its contextualization for the ILTAL

classroom. Shifting the focus from technology and methods to the actual complexity of the educational experience with ETs implies the necessity of a complex analysis to be conducted by situated observation and practice (Goodyear & Carvalho, 2019). Henceforth, observations, focus groups and interviews were implemented in order to achieve the aims of the study, as it will be described in more details in the methodology section. However, albeit aspiring to a holistic, detailed analysis of all the agents and the relations involved in the ILTAL environment with MAR, the researcher had to make strategical choices related to time, economical resources and infrastructural constraints, as well as having to deal with the consequences of the Covid-19 pandemic on the research design. Consequently, considered the importance which Fawns (2022) attributes to educators, as well as the main research gaps previously discussed and in the light of the restrictions imposed by the pandemic, the researcher decided to focus on the investigation of teachers' experiences in terms of values and purposes *in action*.

3.1.1 Teachers' values and purposes in action as 'reflective conversations with the situation at hand'

Considering the fact that in the process of negotiating agencies, teachers and students must be ready to embrace uncertainty, imperfection, openness and honesty (Fawns, 2022), Schön's view (1987) of teachers' reflective conversation with the situation revisited by (Holmberg, 2014a) was considered a viable ground to investigate teachers' values and purposes during the situated use of MAR. Teachers' implementation of an emergent technology such as MAR is therefore researched in terms of their *situated* reflections on the process of contextualizing the digital technology in classroom (Bardone et al., 2022, 2023; Holmberg, 2014a). As previously discussed in this work, educators' purposes and values are indeed at the source of specific decisions undertaken during the teaching and learning experience. Therefore, by reflecting on the situation in order to take decisions, teachers are in the process of transforming and aligning their purposes and values to their teaching practice. In this sense, teachers' reflections with the situation can

be understood as teachers' values and purposes *in action* during the process of tools' contextualization.

This perspective is adopted for a number of reasons. First of all, it allows the development of an investigation which tries to align educational research with practice, an issue that was already underlined by Schön almost forty years ago and that it is still unsolved in educational research, as previously mentioned in this work (Castañeda et al., 2020; Dron, 2022; Fawns, 2022). According to (Schön, 1992), the cause of such disconnection between educational practice and research is related to the heritage of the positivist epistemology, which shaped the dominant view on educational research and practice in terms of 'technical rationality', where scientific theories are applied to solve problems. However,

> 'Schön believed that when practitioners, for example teachers, identified problems and designed solutions to these problems, they did not do this by applying the right means to an end but rather by having a 'reflective conversation' with the situation at hand' (Holmberg, 2014, p. 296).

Therefore, by investigating situated teacher reflections on their educational use of digital technologies it is possible to overcome the educational research-practice dichotomy and to produce actionable knowledge (Fawn, 2022; Dron, 2022).

Schön develops the concept of teacher conversation with the situation in terms of teacher reflection-in- action and on-action.

> Teachers' reflection-in-action leads to on-the-spot modifications of their knowing-in-action; modifications that elicit 'back-talk' from the situation, which in turn leads to new reflection-in-action that might again affect practice, both in the situation at hand and perhaps also in the future (D.A. Schön, 1983, p. 347).

Consequently, the process of connecting with the knowledge developed during the teaching-and-learning process is defined by Schön as teachers' reflection-on-action, because educators consciously reflect on the thoughts and decisions previously undertaken during the teaching experience. The concepts of teachers' reflection in- and on-action are therefore crucial for the aims of this study, since their exploration allows to develop valuable knowledge on MAR contextualization from a teachers' needs

perspective. For this reason, Schön's concept of teachers' reflection with the situation could be researchable in terms of teachers' values and purposes *in action*. In the EPM, Fawns (2022) underlines the central role that teachers' purposes and values play in undertaking decisions on teaching and learning and, consequently, in shaping the entire learning experience (Dron, 2022). Henceforth, an exploration of teachers' purposes and values in action can be considered a valuable way to understand what Schön defined as 'teachers' reflection with the situation' and, therefore, MAR contextualization in the ILTAL ecosystem from an EP perspective.

Another reason to consider Schön's perspective valid for the aim of this study consists of the way in which he conceives the relation between teachers and researchers. By interpreting the affordances of educational technologies and their possible implementations in order to support learning, teachers become sorts of researchers *in situ* (Schön, 1992). The results of such a research would mainly consists of teachers' use of educational technology, while the core of the experience (being this the implicit reflections of teachers with the situation) should be investigated by the actual researcher. Therefore, the teaching practice is conceived as the setting where teachers and researchers can generate and develop actionable knowledge, and not only apply it as in the positivist epistemological conception of educational research and practice. In this regard, it is worth mentioning Holmberg (2014) again, which underlines how

> a valid research approach could be one in which researchers and teachers work more closely together. With such an approach, researchers would have an opportunity to study and understand the different aspects of teachers' practices as expressed through their reflective conversations with situations in different contexts. Teachers and researchers could engage in collaborative educational design, i.e. in collaborative reflective conversations with situations. Having teachers and researchers bring their respective professionalisms to the situation could help to bridge the gap between theory and practice and contribute to scientific rigour in the search for a better understanding of teachers' design with educational technologies. It could arguably even help make the tacit knowledge underlying teachers' design decisions and actions more visible and less esoteric (Holmberg, 2014, p. 298)

Consequently, the current research study was conducted according to this perspective, developing a strong collaboration among the researcher and teachers *in context* in order to try to achieve an extremely detailed description of an educational technology entanglement in a language teaching-and-learning environment from teachers' perspectives. Nevertheless, it must be acknowledged that even with the more detailed observations and analysis, it is not possible to account for all the processes, actions and reflections happening during the process of tool contextualization (Holmberg, 2014). However, despite these difficulties 'educational research could help provide insights into, and thus enhance, practitioners capacities for reflective conversations with situations' (Schön, 1983, pp. 307–308).

An interesting perspective to explore the concept of teachers' reflections with the situation is given by (Bardone et al., 2023) with their theorization of tinkering, which is described in more details in the next paragraph. The work of the scholars is considered as part of the theoretical structure of this research study because it provides a useful frame to interpret the process of tool contextualization, which is perfectly in line with the other theorical constructs which the research aims to explore. Nonetheless, before describing the terms in which this process is conceived in the context of this study, one last aspect in relation to the exploration of teachers' values and purposes in action must be considered. Both Fawns (2022) and Schön (1983; 1992) highlighted the importance of the context in shaping teachers' values and purposes in action (or teachers' reflection with the situation) because of the situated nature of teaching. The teaching and learning experience is always unique because it is influenced by the characteristics of the specific context in which it happens. Therefore, not only teachers', students' and other stakeholders' roles and relations should be considered in ETs' investigations, but also the cultural, social and economic characteristics of the context where the studies are conducted, as it happened in the case of the current research.

3.1.2 Tool contextualization as tinkering

In their view, (Bardone et al., 2023) describe technology integration as a process consisting of a number of aspects. On the one hand, it depends on teachers reflections with the situation at hand, as in Schön's (1992) or Holmberg's (2014) views. On the other, the scholars add something to Schön's view, by underlying how the process of tool contextualization does not only consists of teachers' conversations with the situation, but it is also formed by design as a problem-solving process. The integration of digital technologies is therefore a goal-directed problem-solving process during which teachers not only apply means-to-end analysis, but also develop reflective conversations with the situation at hand. According to the scholars, this complex process of tool contextualization can be explored and understood in terms of tinkering.

Without delving into all the specific disciplines and concepts from which (Bardone et al., 2023) developed their theorization of tinkering, in this context it is relevant to highlight the fact that it is largely inspired to Lévi-Strauss & Lévi-Strauss (2000) conceptualization of tinkering as "bricolage", in the sense of using whatever comes in useful. In tinkering, therefore, resources are recruited as the process unfolds and the process is not structured on specific planning (Bardone et al., 2023). Moreover, the scholars underline the fact that tinkering is adaptive and, differently form design, is an open-ended process, which means that objectives and aims cannot be completely specified in advance (Bardone et al., 2023). According to the scholars, tinkering is a responsive process to what happens in action and through what we have at hand and, for this reason, it could be understood as the development of what Schön (1983, 1992) called reflective conversations with the situation.

In problematizing the concept of design and by trying to theorize the concept of tinkering as a complement of it, (Bardone et al., 2023) not only criticize deterministic assumptions according to which tools affordances can be specified in advance, but they also underline the importance of the process of tool contextualization (which they call *concretisation*), through which a tool actually acquires meaning in relation to the characteristics of a specific teaching and learning context. Henceforth, the concept of tinkering as a practical theorization of the process of tool contextualization perfectly

works in relation to the theoretical and pedagogical assumptions of the current study, which aims at investigating the values and purposes which teachers attribute to MAR during the process of its contextualization, from an Entangled Pedagogy (Fawns, 2022) perspective. By conceiving MAR contextualization in terms of tinkering, it is possible to observe IL teachers' reflections with the situation and, therefore, their values and purposes *in action* during the process of contextualization itself, which developed through what *came in handy.*

Practical examples of tinkering by teachers according to (Bardone et al., 2023) are chance-fix or trial-and-error, an exploration of the polysemy or latent functionalities of tools, as well as tool contextualization itself. A specific exploration of each case is beyond the scope of this study, which adopts the concept of tinkering as tool contextualization for its capability to make teachers' reflections with the situation observable and researchable and, therefore, to enable an exploration of teachers' values and purposes in action. In order to achieve this aim, a number of constructs were explored, as it will be described in details in the next paragraph.

3.2 How to explore teachers' values and purposes?

As repeatedly underlined, at the core of Fawns (2022) model of Entangled Pedagogy is the idea that teachers' purposes and values are at the basis of the decisions undertaken during the teaching and learning process. Therefore, exploring teachers' values and purposes should be a main objective of educational research, even considered the number of issues related to their exploration. Nevertheless, considered the crucial role that they play in the process of tools contextualization according to the perspective of the EP, the current study aimed at exploring them. As previously discussed, values and purposes can be understood in terms of Schön's (1992) teachers' reflections with the situation. Moreover, teachers' reflections become observable in the frame of tool contextualization in terms of tinkering, which, in turn, allows an exploration of teachers values and purposes *in action*. However, in order to actually explore them, it is not enough to conceive them in terms of teachers' reflections on tools' contextualization, but it is considered necessary to operationalize values and purposes in a number of constructs which, considered in their

totality, enables an effective exploration of teachers' experience on MAR contextualization for the ILTAL.

Firstly, 'educational values are beliefs about what matters within learning and teaching, including ideals, standards, principles and qualities of intrinsic worth' (Fawns, 2022, p. 717). For this reason, the first constructs considered fundamental in order to explore teachers' purposes and values are the concepts of Teachers' Beliefs (TB) and Attitudes (TA) towards educational technology implementation. Furthermore, other elemtents able to shape the teaching and learning experience are considered, such as teachers' levels of Anxiety and Comfort (AC) with the tool, as well as aspects related to the economic, infrastructural, social and cultural context, which will be indicated as External Agents (EA).

3.2.1 Teacher Attitudes

A plethora of definitions of attitude have been elaborated in a number of scientific fields (Campbell, 1963; Fazio, 1990; Oppenheim, 1982). An attitude has been defined as "a mental and neural state of readiness, organized through experience, exerting a directive and dynamic influence upon the individual's response to all objects with which it is related" (Allport, 1935, p. 810), but also as a psychological construct (Oppenheim, 1982), as beliefs (Rokeach, 1989) as dispositions (Ajzen, 2011; Campbell, 1963) or memory associations (Fazio, 1990). 'An attitude can be defined as an individual's positive or negative feeling (evaluative affect) about performing the target behavior' (Fishbein & Ajzen, 1975, p. 216) or as a multi-dimensional construct composed by a complex system of cognitive, affective, and conative elements (Zhang & Slaughter-Defoe, 2009).

As it can be seen, the definitions of attitudes varied significantly in time, depending on the constructs considered in order to describe them. From the number of definitions available in the extant literature on attitudes, the present study adopts the concise description elaborated by Eagly & Chaiken (1993), since it is considered to be particularly relevant for the context and the aims of this research. The two scholars defined attitude as a 'a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor' (Eagly & Chaiken, 1993, p.1). Moreover, this definition can be interpreted considering the explanation of attitude that Allport (1935) elaborated

from the field of social psychology. He described the central role that attitudes have in our interpretation of the environment and in the modalities in which human beings interact with objects and people, explaining that

> Without guiding attitudes the individual is confused and baffled. Some kind of preparation is essential before he can make a satisfactory observation, pass suitable judgment, or make any but the most primitive reflex type of response. Attitudes determine for each individual what he will see and hear, what he will think and what he will do. To borrow a phrase from William James, they 'engender meaning upon the world'; they draw lines about and segregate an otherwise chaotic environment; they are our methods for finding our way about in an ambiguous universe (Allport, 1935: 806).

Therefore, attitudes can be considered 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. Consequently, teacher attitudes play a crucial role in describing teachers' values and purposes change when introducing an educational technology in a specific setting (Sun & Gao, 2020). It is thus fundamental to consider them in order to explore and understand teacher conversations with the situation when implementing MAR in the IL classroom.

3.2.2 Teacher Beliefs

As explained in the introduction section of this paragraph, together with attitudes, teachers' beliefs are crucial to explore teachers' reflections in- and on- the contextualization of a new technology such as AR. Indeed, 'research on educational innovations suggests that technology integration can only be fully understood when teachers' pedagogical beliefs are taken into account' (Tondeur et al., 2017, p. 2). Already in 1992, Pajares highlighted the difficulties in defining the complex concept of teacher beliefs, labelling them as a 'messy construct' and underlying that 'the difficulty in studying teachers' beliefs has been caused by definitional problems, poor

conceptualizations, and differing understandings of beliefs and belief structures' (Pajares, 1992, p. 307). Nowadays, the difficulties underscored by Pajares have not been completely overcome. As highlighted by (Tondeur et al., 2017, p. 216) 'It is difficult to describe teacher beliefs in unequivocal terms considering the myriad of ways they have been defined in the literature'. This difficulties are mainly related to the issue of determining if teacher beliefs differ, and in which ways they do so, from the concept of *knowledge*. According to Ertmer et al. (2012) beliefs generally refer to suppositions or ideologies, while knowledge relates to 'factual propositions and understandings' (Ertmer et al., 2012, p. 424).

Accepting this distinction, 'after gaining *knowledge* of a proposition, we are still free to accept it as being either true or false (i.e., believe it, or not)' (Ertmer, 2005, p. 28). Therefore, teachers may gain specific knowledge on how to design and implement mobile AR in the language classroom, but they could not believe that this emergent technology consists of a beneficial tool for language teaching and learning. Based on this distinction between knowledge and beliefs, several scholars (Ertmer, 2005; Ertmer et al., 2012; Fazio, 1990; Pajares, 1992; Zhang & Slaughter-Defoe, 2009) concluded that 'beliefs are far more influential than knowledge in determining how individuals organize and define tasks and problems. This, then, makes them stronger predictors of behavior' (Ertmer, 2005, p. 28). This ability of beliefs to predict and influence behavior is due to the nature of the belief itself. According to Nespor (1987), beliefs rely on memory of personal experiences. Therefore, the perception of a specific event is affected and shaped by the memory of previous experiences. In terms of teacher beliefs regarding the implementation of ICTs in the classroom, an example could be represented by a teacher that had negative initial experiences with some technological tool. These past events create a filter able to affect new experiences and it will be hard to persuade that teacher on the possibility to experience ICT implementation as educational tools in a positive manner.

Having clarified the fundamental distinction between beliefs and knowledge, as well as the nature of the relation between beliefs and their capacity to influence behavior, a question still remains open: how do we define beliefs in order to explore them for the purposes of this study? As previously explained, it is not easy to unequivocally define beliefs, because of the plethora of perspectives from which they have been defined in the

literature. However, considering the issues discussed and the characteristics of beliefs described so far, a comprehensive definition could be the one elaborated by (Petko, 2012), according to which a belief 'can be understood as a subjective element of knowledge that an individual considers true and important in relation to a specific subject' and that it is 'bound up with a person's past history, emotions, and personal values' (Petko, 2012, p. 1353)

Nevertheless, in order to define and comprehensively understand the concept of beliefs as researched in the context of this study, another consideration is fundamental. According to scholars like Ertmer (2005) and Pajares (1992), individuals have beliefs about everything. Therefore, when exploring these theoretical concepts in educational settings for research purposes, it is fundamental to make a broad distinction between general belief systems and educational beliefs (Ertmer, 2005). Consequently, for the purposes of this research study, the author embraces the perspectives of scholars like Ertmer et al. (2010), Petko (2012) and Tondeur et al. (2017), according to which teacher educational beliefs must be further narrowed down in order to understand how teachers translate their belief systems into classroom practice. This means that the focus must shift to what Ertmer (2005) defines as *pedagogical beliefs*, that consists of specific teacher educational beliefs about teaching and learning and that from now on will be indicated as TPBs (Teacher Pedagogical Beliefs). Therefore, understanding TPB about a technology is equivalent to understanding the values that teachers' give to the introduction of that technology in the classroom, that is, to understand teachers' values and purposes *in action*, which is equivalent, again, to an exploration of teachers' reflection with the situation during tool contextualization as tinkering.

However, in researching TPBs it is important to consider the fact that, even though teachers' beliefs play a crucial role in shaping teachers' agency and decision-making, the role of the wider institutional discourse and the need for a

> robust professional vision of the purposes of education indicate that the promotion of teacher agency does not just rely on the beliefs that individual teachers bring to their practice, but also requires collective development and consideration (Biesta et al., 2015, p. 624).

Therefore, as largely discussed so far, the role played by the number of factors involved in the micro, macro and meso educational context cannot be underestimated in researching TPBs.

After the elaboration of the theoretical aspects of TPB which are relevant in order to explore teachers' reflections on MAR implementation, two main issues related to the process of researching TPB must be considered. As explained in the introduction of the paragraph, the study of teacher attitudes and belief systems is crucial to understand teacher needs regarding technology implementation and, consequently, to produce actionable knowledge, which will hopefully enable a change in their classroom practice. Indeed, such a change must first occur in their attitudes and beliefs systems (Davis & Davis, 1989; Pajares, 1992). However, as underlined by scholars like Nespor (1987) or Tondeur et al., (2017), shifts in TPB systems are unlikely to happen because of the inconsistent nature of the TPB itself, that can be quite idiosyncratic even at an individual level. Moreover, since TPB systems, differently from knowledge systems, do not require group consensus, it is likely for the researcher to have to face a situation where 'two teachers who *know* the same things about a technology might *believe* different things about its use (e.g., one seeing it as a blessing; the other as a curse)' (Ertmer, 2005, p. 30). The consequences in terms of research are clear, since it is not easy to consider all the individual and general differences in order to comprehensively describe a phenomenon. According to the author of this study, a solution to overcome this issue may be the adoption of a qualitative approach to data collection and analysis, considered the possibilities that qualitative methodologies offer in terms of insights in exploring personal experiences. For this reason, the present study implemented a fully qualitative approach, as it will be described in the next section of this thesis.

The last issue regarding TPB which is worth discussing here relates to the manner in which TPB can be explored. Considering the goal of this research study only specific TPB about technology were considered. Because little has been researched regarding how these TPB are formed, the perspective adopted in the study is the one according to which TPB about technology follow the same path as general beliefs (Ertmer, 2005). Indeed, several studies in time demonstrated how teachers implement new technologies in classroom in a way that is consistent with their personal beliefs about curriculum and instructional practice (Eickelmann & Vennemann, 2017; Sun & Gao, 2020). Therefore,

TPB about technology can be considered (and thus researched) as the same as other beliefs. Consequently, the contextualization of MAR in the IL classroom can be researched by considering, among other constructs, TPB about technology, which allow, in turn, to explore what Fawns (2022) defined as teachers' values and purposes *in action.* As Windschitl & Sahl (2002) suggested, indeed, there 'can be no institutional 'vision of technology use' that exists separately from beliefs about learners, beliefs about what characterizes meaningful learning, and beliefs about the role of the teachers within the vision' (2002, p. 202).

3.2.3 Perceived Usefulness and Perceived Ease of Use

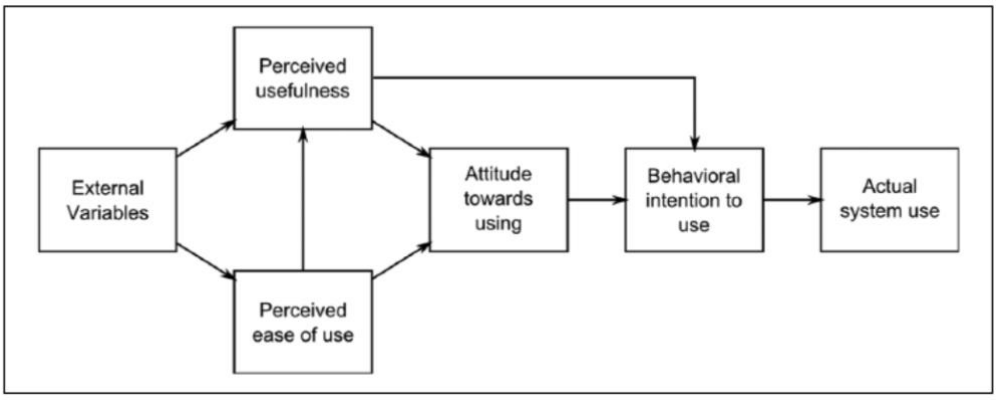
Two teachers' beliefs considered crucial for the aims of this research study since they allow to understand how teachers' align their values and purposes to their classroom practice are Perceived Usefulness (PU) and Perceived Ease of Use (PEU). According to authors like (Davis & Davis, 1989) or Sun & Gao (2020), this beliefs have a direct effect on attitudes and, therefore, on teachers' reflections on technological tools contextualization, as well as on the intention to implement a specific tool in the future (Davis & Davis, 1989). Both these beliefs were operationalized in the Technology Acceptance Model (TAM) by Davis (1989), one of the first models able to consider the psychological factors that can influence perception about technology implementation. Therefore, even though a consideration of the TAM model it is not in the interest of this research study, it is useful to refer to it in order to describe the two constructs of PU and PEU, which are here explored. PU is described as 'the subjective probability that using a specific application system will increase [a person's] job performance within an organizational setting' (Davis & Davis, 1989, p. 985). This definition of PU is close to the definition of value in the field of psychology (Chen, 2010), where theories like the one of the expectancy–value try to explain someone willingness to perform a specific behavior.

A number of studies, indeed, proved how the concept of value (in Davis terminology, of PU) can be a significant parameter to predict teachers' intention to implement technology in classroom. Henceforth, it can be considered as a strong indicator

of what Schön (1987) or Holmberg (2014) defined as latent teachers' knowledge and design decisions. On the other hand, PEU 'refers to the degree to which the prospective user expects the target system to be free of effort' (Davis & Davis, 1989, p. 985). It has been proved that PEU has a direct effect on the degree of acceptance and implementation in classroom of new technologies (Petko, 2012; Sun & Gao, 2020), even though it must be considered less consistent than PU (Eickelmann & Vanneman, 2017). Therefore, both PU and PEU directly affect individual attitudes towards technology implementation, Moreover, PEU has a direct effect on PU that, in turn, has an indirect effect on the behavioral intention to use a specific technology in the future, as it is possible to observe in the TAM model, which is here reported in Figure 11 for the sake of completeness.

Figure 11

The Technology Acceptance Model (TAM) (Davis et al., 1989, p. 985)



3.2.4 Anxiety and Comfort

The theoretical constructs considered so far consists of internal factors able to influence teachers' reflections on tools contextualization. According to Eickelmann & Vennemann (2017) they are crucial prerequisite for ICTs adoption in the classroom and are hardly subjected to change, since they consists of teacher attitudes and beliefs capable of shaping their pedagogical practices. On the other hand, external factors such as infrastructures, time constraints or technical support are more likely to change, since they do not depend on internal belief systems. Before exploring these external factors in more details, two

other internal aspects able to influence teachers' values and purposes in action must be considered, and these are Anxiety and Comfort (Webb & Doman, 2019). Both these constructs are adopted from the Computer Attitude Questionnaire (CAQ), an instrument developed by the Institute for the Integration of Technology in Teaching and Learning at the North Texas University and already implemented in a number of studies. Even though the questionnaire was elaborated to understand student dispositions towards technology implementation in school, the two constructs of Anxiety and Comfort can be considered in order to explore teacher reactions to a specific ICT (Webb & Doman, 2019) and where, therefore, implemented in the context of the current research.

3.2.5 External Agents

Researching teachers' reflections on technology contextualization in education consists of a complex and detailed activity, since it requires the researcher to try to consider all the number of relations happening among the plethora of agents involved in the classroom environment (Fawns, 2022). Therefore, even the more detailed observations will not be able to account for all the processes, actions and reflections happening during the teaching and learning process (Holmberg, 2014). However, despite these difficulties educational researchers should try to provide the more holistic insights into educators experiences (and therefore into their reflective conversations) with tools contextualization. Therefore, not only internal beliefs and dispositions should be researched and explored, but also External Agents (EA) related to MAR contextualization in classroom, since they participate in the shaping of the teaching-and-learning environment (Fawns, 2022). A main issue relates to the availability of a solid technology-based infrastructure in schools, for example, which is strongly able to affect teachers' willingness to contextualize a digital tool in classroom (Pegrum, 2021). Because of the social and economic nature of the context of this research, this issue is particularly relevant in the scope of this study.

Other EAs able to shape the teaching and learning experience with technology are time constrains for teachers and the level of technical support available for educators. These aspects, together with the issue of infrastructures, acquire particular importance in

the Argentinian context, where most of the teachers have to teach in two or more institutions because of the economic situation of the Country. This can result in a lack of time and motivation to experiment the implementation of new technologies in the classroom. Moreover, many times educators do not receive technical support when using a new digital tool for instructional purposes and sometimes the technical support available is just limited to the basics.

A last factor that can be considered among the agents able to affect tools contextualization for educational purposes is the Task Technology Fit (TTF), (Sun & Gao, 2020). The TTF considers the effects that the characteristics of a specific task can have on a person's attitude towards ICT use. Therefore, according to the TTF, 'the more supportive a technology is to users' specific tasks, the higher the perceived task technology fit, and the higher the technology utilization' (Sun & Gao, 2020, p. 9). Considered this definition and the role that tasks themselves can have in influencing educators' attitude towards a specific technological tool, the TTF is considered among the constructs implemented for the exploration of teachers' purposes and values in action, as observable in Figure 14.

4. ITALIAN LANGUAGE TEACHING AND LEARNING IN ARGENTINA

4.1 A necessary premise: common dynamics of the Italian migration in Latin America

Dealing with the state of the Italian Language Teaching And Learning in Argentina necessarily means to deal with the specific characteristics of the linguistic history of Italian migration in the Country. However, when considering the history of Italian migration in Argentina it is useful to briefly look at the phenomenon in the wider geographical context of Latin America, in order to understand how some peculiarities of the geographical area closely influenced the current dynamics of the ILTAL (Patat, 2004). The linguistic vicissitudes of Italians in Latin America are intertwined with the educational policy decisions of individual countries, which developed through both top-down and bottom-up approaches. Because the independence of the countries of Latin America was achieved a few years later the first Italian migration wave, a number of States started to develop forms of compulsory education which sometimes were in contrast with schools previously opened by the Italian immigrants themselves.

Moreover, among the groups of Italians in South America started to emerge a feeling of abandonment towards the newly built Italian State back home, which seemed to have forgotten the citizens who emigrated. The consequence, especially during the first migration wave, was the greater trust placed in local schools such as those of religious and cultural groups. Founded at the time of the first migration (1889), the Dante Alighieri Society is a good example of these type of institutions. Between 1896 and 1899 it opened several committees in the cities of Latin America with a strong Italian presence. These kind of schools offered vocational training courses in addition to Italian language, which was sometimes perceived as a novelty considering the illiterate or dialectophone origin of emigrants (Patat, 2004).

Although the history of Italian migration in Latin America is shaped by the peculiarities of each country, and albeit in countries like Brazil, Venezuela, Uruguay and Argentina linguistic dynamics linked to the history of migration were different from Chile, Colombia or some countries of Central America, certain homogeneity of the phenomenon can be observed in a number of factors. Firstly, the crucial role which

religious and cultural institutions had in promoting and developing an Italian identity, also built around the *novelty* of Italian language. Secondly, the strong sense of belonging of Italian immigrants to these religious and cultural associations, also due to the feeling of abandonment from the newly born Italian State. Thirdly, the degree of influence of top-down language polices of each country, sometimes in contrast with the previous bottom-up language management decisions, which shaped the dynamics of the Italian language education. For all these reasons, Latin America played a crucial role in the linguistic history of the entire Italian migration and nowadays it can be considered, after Europe, the territory in which it is possible to feel the strongest need for a (re)discovery and a (re)conquest of the Italian language and culture (Bagna, 2021).

Currently, in Latin America Italian is taught at school and in universities, it is visible in public communication, it is also present in the Italian press produced locally and in a number of cultural associations. Moreover, the historical-political-linguistic events described so far resulted in a strong interest in contemporary linguistic phenomena concerning the Italian language. A plethora of Italian language departments of main universities of Latin America, such as the University of Buenos Aires (UBA), are sensible not only to the current status of the Italian language, but also to the crucial issue of teacher training. According to the latest pre-Covid-19 data, Argentina is the second Country for the number of Italian language students in the entire American continent, after the United States (MAECI, 2019). Before looking at the current status of Italian language teaching in the Country, it is necessary to briefly describe the specific dynamics of the history of Italian migration in Argentina, in order to understand how they shaped the current situation of the Italian Language Teaching and Learning in the Country.

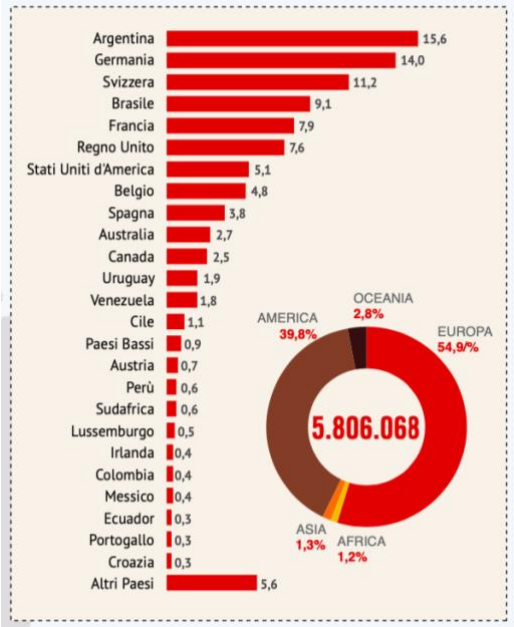
4.2 Italian migration in Argentina and its linguistic peculiarities

Argentina is one of the countries where the greatest number of Italians converged in the history of the Italian migration in the entire world (Vedovelli, 2021). The migratory flows from Italy to Argentina mainly interested the years between 1861 and 1945, with a total number of 2.450.129 subjects arriving during the first migration wave (Bagna, 2021).

This data could already suggest the contemporary importance and prestige of the Italian language teaching and learning in the Country. In the period between 1945 and 1990, a total of 511.641 Italians followed the numbers of the first wave (Bagna, 2021). The settlement areas of the Italians were mainly urban, with major interest in cities such as Buenos Aires, Cordoba, Santa Fe and Entre Ríos. The impact of emigrants was significant, also considering the fact that in 1869 the Argentine population did not reach 2 million (Rosoli, 1979). It is estimated that nowadays half of the Argentinian population has Italian origins and according to the latest report of the 'Italian Migrantes Foundation', today Argentina is the first Country for number of Italians living there, with a total of 903.081 people (Fondazione Migrantes, 2022), as it can be observed in Figure 12. This data must be interpreted in relation to the high demands for Italian citizenships within the Country.

Figure 12

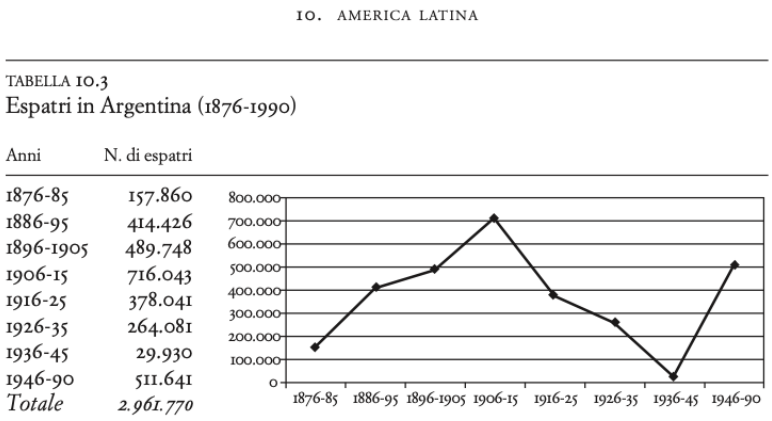
Italians living abroad (Fondazione Migrantes, 2022)



Argentina is the second Country, after the United States, which in the period between 1876 and 1990 welcomed the largest number of Italians in the Americas, as can be seen in Table 4.

Table 4

Migration flows from Italy to Argentina among 1876 and 1990 (Bagna, 2021, p. 313)



10. AMERICA LATINA

TABELLA 10.3
Espatri in Argentina (1876-1990)

Anni	N. di espatri
1876-85	157.860
1886-95	414.426
1896-1905	489.748
1906-15	716.043
1916-25	378.041
1926-35	264.081
1936-45	29.930
1946-90	511.641
Totale	*2.961.770*

The waves of Italian migration in Argentina can be distinguished as follows. At the end of the XIX century there was a consistent wave of emigration, with a prevalence of subjects from northern Italy (Piedmont, Liguria, Lombardy, Veneto, Friuli). The peak was registered in 1913, with 111.500 Italians arriving to Argentina, when the massive migration from southern Italy (Campania, Calabria, Sicily) started in conjunction with the return flows of a part of the emigrants. In the period between the two wars, modest flows were registered, also due to the international economic recession. After 1945 emigration started again, with a majority of people from regions of the South, such as Calabria, Campania, Abruzzo, Molise and Sicily. The the census of 1947 recorded 786.207 Italians moving to Argentina (Rosoli, 1979).

A data is worth considering when reflecting on the peculiarities of the Argentinian case in Latin America. In 1876, the presence of Italians in Argentina was already far superior to that of Brazil, the other main Country for the number of Italian immigrants. This probably derives from the type of settlements in Argentina, where cities were

immediately privileged as places of destination, even though emigration to the countryside was registered as well. Nevertheless, the Argentinian case presented another originality, being this the occupational diversity of Italian immigrants (Devoto, 1993). On the one hand, it is true that the Argentinian migration policies allowed Italians to obtain lands in territories completely or almost unexplored. On the other, as already discussed above, the possibility to settle in urban areas of the main cities enabled the possibilities for Italians to work in a number of different activities. In 1909 the Italians in Buenos Aires owned 56% of the mechanical and metallurgical plants, 46.3% of the textile industries, 57% of the food industries and 78.6% of the construction industry. Moreover, the 1914 census indicated that 21% of the total of farm owners were Italian (Rosoli, 1979).

Italians in Argentina were an enormous group, present in a plethora of working sectors, both in urban and rural areas. The arrival of immigrants, not only from Italy, consisted of an investment for the economic, cultural and social development of the Country. However, Italians were the demographic group more able to affect the pre-existing social, economic, cultural and linguistic structures of the Argentinian population. Buenos Aires and all the area of the Rio de La Plata was characterized by a mixture of languages, hybridisms and varieties of Italian and other languages. In such a Babel, conditions for contacts among different linguistic varieties were a daily reality. Therefore, in the linguistic history of migration in Argentina there are not real linguistic colonies, but a plethora of hybrid forms, resulted from the mixture of different languages and varieties, which allowed the creation of phenomena such as the *Cocoliche* or the *Lunfardo,* mixtures of Italian, Spanish and Portuguese, spoken by the first Italian immigrants, spread through the world of the tango and also integrated into the Argentinian best literary production (Patat, 2004; Vedovelli, 2021).

4.3 Italian Language Teaching and Learning in Argentina yesterday and today

In such a mixed scenario of different linguistic varieties and hybridisms, what was, then, the role of the Italian language? First of all, it must be underlined the fact that emigrants

from Italy were mainly peasants, artisans or small traders. Even those cases which developed in an entrepreneurial component in Argentina, did not correspond to a social class highly educated coming from Italy. Therefore, for Argentina, the arrival of Italians consisted of a crucial educational challenge. Despite the high percentage of people from the northern regions, illiteracy rates of Italians were higher than those of other immigrant groups, such as Spanish or French. In Buenos Aires the 18% of Italian population were illiterates in 1887. In the following years the percentage grew, with 1914 being the year during which Italians in Argentina registered the highest rate of illiteracy, with the 36.3% (Rosoli, 1979). As mentioned in the previous paragraph, the dialects of the regions of origin were the L1 of the Italian immigrants and, once in contact with Castilian and its Argentine varieties, started to develop in hybrid language structures, rich in dialect inflections or Italianisms. The many dialects of the Italians had such a powerful influence on the Rio de la Plata area which is impossible to compare to any of the other languages present there. Politicians were frightened by the possible consequent loss of an Argentinian identity and started to adopt language policies addressed to a return to pure Spanish (Bagna, 2021). Because of the monolingual and assimilationist model of the Argentinian government towards immigrants, children did not learn Italian from their parents or at school, since the goal was to strengthen and disseminate public and compulsory education in Spanish, in order to integrate immigrant communities into the Argentine and Spanish-speaking system.

Nevertheless, albeit the plethora of dialects used in the family and in community environments, Italian immigrants had already begun to organize themselves in order not to lose their Italian cultural identity, so in 1867 the Italian Elementary School managed by the association *Unione e Benevolenza* began to operate (Patat, 2004). A school which is still operating nowadays under the name of *Edmondo De Amicis*. In 1896 the Dante Alighieri Society of Buenos Aires was founded with the aim of spreading the Italian language and culture in Argentina. At state level, conservative politicians alternated with others more open from a cultural perspective and in front of such a large number of Italians in the Country, in January 1900, the Argentine Senate approved a law for the teaching of the Italian language in high schools throughout the entire Country (Patat, 2004). This was followed by improved diplomatic relations between Italy and Argentina,

when the wave of the rediscovery of roots began. Only starting from this moment did 'speaking Italian start to become beautiful, useful, interesting' (Bagna, 2021, p. 318).

Nevertheless, following another peak of immigration in 1914, Carlos Saavedra, Minister of Justice and public education, banished Italian in public schools, but Hipolito Yrigoyen introduced it again in 1917. Therefore, the history of the teaching of the Italian language in Argentina is linked to economic events and to the changes in the political direction of the two Countries. Nevertheless, bottom-up actions from Italian communities in order to maintain their identities never stopped. At the time of the fascist government, the *Pro Schola* worked in Buenos Aires, with a group of five schools with Italian programs and professors. Moreover, is essential to consider the weight of the so-called ethnic institutions, such as the mutual aid societies (*società di mutuo soccorso*), which in the first decade of the twentieth century where 366 with 116 thousand members (Rosoli, 1979). The same applies to cultural associations, which in 1914 were around 500 with roughly 150 thousand members (Bagna, 2021). Another pole of education in Italian particularly active in the first decade of the XIX century consisted of the Salesian schools, in particular with their institutes for vocational training. Education was conducted in Spanish, but Italian was also taught.

The aim was to adapt the programs and manuals implemented in Italy to the local language system, with Italian entering the classroom as a foreign language from the third grade (Rosoli, 1979). Outside the school environment, the Salesians used Italian also in their pastoral activities. A fundamental role was also played by other religious groups, such as the *Scalabrinians* or the *Italica Gens,* which considered fundamental to contrast the cultural and identity loss of the second generation of Italians. Henceforth, education of young people both in Spanish and Italian was considered fundamental. Italian should have the same importance as Spanish and it was crucial to illustrate the values and splendors of Italian civilization. The Dante Alighieri Society began to spread in the territory more quickly than from its establishment in the late nineteenth century, and the spread of the Italian language found its place in the press as well.

However, the institutional shift arrived when, with the law 297/1994, *ex lege* 153/1971, the Italian Minister of Foreign Affair (MAE) promoted Italian language courses for Italian citizens abroad, as well as for people of Italian origins and foreigners. The law was basically aimed to support children of Italian emigrants in the second post-

war period, mainly addressing student in formal compulsory education and adults as well. About 60% of the courses were included in local schools schedule, thanks to a new system of agreements between Italian political institutions and school authorities in Argentina. Several were activated as preparatory courses in order to support the educational integration of Italian immigrants children, while the rest were courses for adults learners (Bagna, 2021). Private local bodies, the so called 'managing bodies' (*enti gestori*), supported by Italian fundings, started not only to manage the integration of Italian language courses, but also the hiring of teachers locally by Argentinian authorities.

Moreover, tenured teachers were sent from Italy (MAE, 2010). Even with these institutional actions and with the bottom-up initiatives previously described, at the end of the 1980s the position of Italian language teaching was classified as marginal, since the Italian language was considered as something closely confined to the Italian people (Patat, 2004). To complicate the scenario there were the stories of Italy and Argentina through wars, dictatorships and alternating economic fortunes and political directions. It is not surprising, therefore, that the teaching of Italian was not regulated like other languages. To speak about the teaching of the Italian language in recent years it is necessary to start from 1989 when, following the *Resolución Ministerial* of November 1988, it was possible again to study Italian for five years in the secondary schools offering such possibility.

Nonetheless, new issues appeared, especially related to the lack of proper linguistic skills for language teachers. Therefore, starting from the 1990s, teacher training program as well started to be activated at university level, in order to train qualified personnel (Vedovelli, 2021). On May 5, 1997, the general consulate of Italy in Buenos Aires and the government of the same city signed an agreement for the teaching of Italian in public schools. From the years 2008 and 2009 Italian teaching was widely spread, with Italian language becoming the second most studied language after English (Bagna, 2021). In addition to school curriculum, Italian language started to be taught also in the Italian Institutes of Culture of Buenos Aires and Cordoba. According to the last available data before the Covid-19 pandemic, Argentina is nowadays the second Country in the entire American continent for number of students (see Table 5) and the only Country in the world with six (so called) 'equal schools' (MAECI, 2019), as it can be seen in Figure 13. 'Equal Schools' is the English translation for *scuole paritarie*, institutions where local

curricula are integrated with curricula identical to the ones implemented in Italy (for this reason the designation of equal), and both bilingual and CLIL (Content and Language Integrated Learning) methodologies are implemented. Lately in 2023, the Dante Alighieri Society of Campana, in the province of Buenos Aires, was recognized as another Italian equal school, with the Country arriving to a total of 7 schools of this category[9]. Together with the equal schools, Argentina has a total of 125 Dante Alighieri societies (Bagna, 2021), 72 public schools where Italian is taught and 4 teacher training programs (Mórtola & Montserrat, 2019).

Table 5

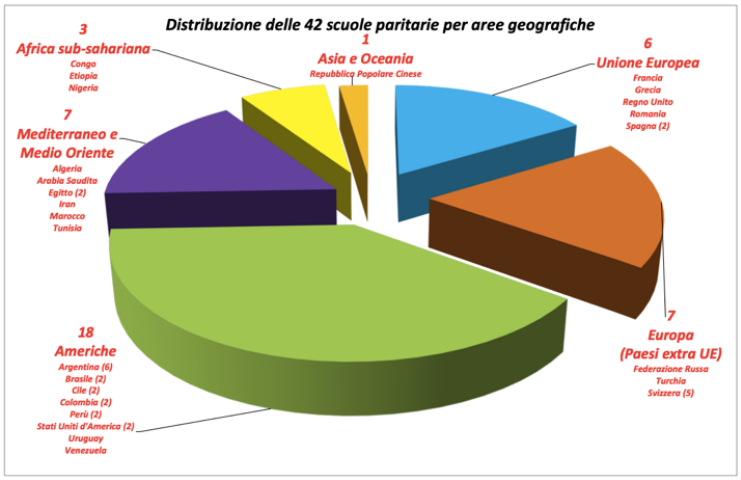
Number of Italian language students of courses supported by the Italian Ministry of Foreign Affairs

Area geografica	totale studenti	(a) studenti universitari (lettori MAECI e contributi cattedre)	(b) studenti scuole italiane statali all'estero	(c) studenti scuole ital. paritarie e non parit. all'estero	(d) studenti sezioni bil-int. c/o scuole straniere	(e) studenti scuole europee	(f) studenti dei docenti ministeriali c/o scuole straniere	(g) studenti corsi Enti Gestori	(h) iscritti ai corsi IIC
Argentina	**48.459**	360	-	4.927	-	-	-	41.028	2.144
Brasile	**26.574**	378	-	1.340	-	-	-	21.157	3.699
Canada	**29.451**	2.944	-	-	-	-	-	24.740	1.767
Cile	**4.614**	314	-	2.085	-	-	-	1.614	601
Colombia	**2.117**	-	-	1.477	-	-	-	-	640
Costa Rica	**120**	120	-	-	-	-	-	-	-
Cuba	**43**	43	-	-	-	-	-	-	-
Ecuador	**150**	150	-	-	-	-	-	-	-
Guatemala	**923**	-	-	-	-	-	-	-	923
Messico	**2.570**	1.220	-	-	-	-	-	138	1.212
Paraguay	**95**	95	-	-	-	-	-	-	-
Perù	**10.211**	1.220	-	1.584	-	-	-	-	7.407
Stati Uniti	**165.645**	75.602	-	225	73	-	-	86.109	3.636
Uruguay	**4.575**	-	-	706		-	-	3.491	378
Venezuela	**2.339**	-	-	137		-	-	-	2.202
totale Americhe	**297.886**	**82.446**	**-**	**12.481**	**73**	**-**	**-**	**178.277**	**24.609**

[9] https://italiana.esteri.it/italiana/cultura/argentina-crescono-le-scuole-italiane-paritarie-nel-mondo/

Figure 13

Distribution of the 42 private Italian schools (Tab. 1, DGSP UFF.V**,** Maeci, 2019)



Considered the numbers related to the IL courses here presented and the cultural, historical and economic relations among Argentina and Italy, the Country was considered a meaningful context for the development of the research study.

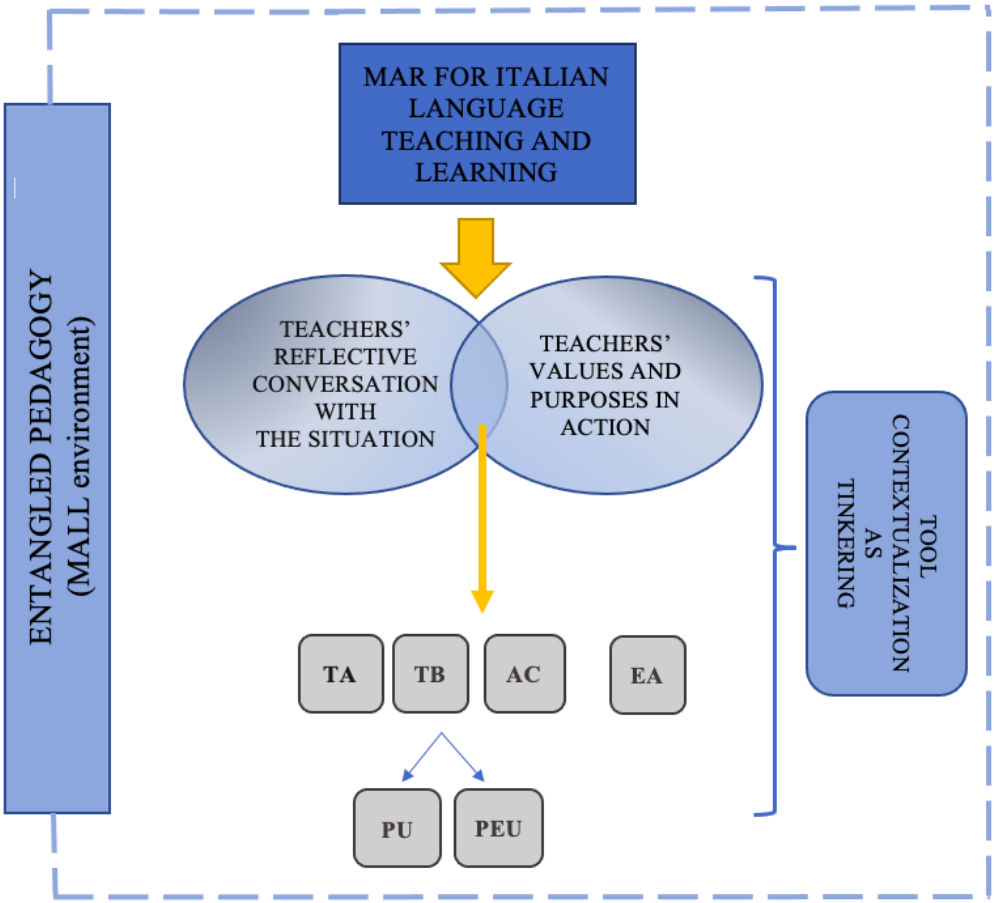
SYNTHESIS AND CORRELATION OF THE REVISED LITERATURE

This section closes the theoretical framework of the research study by synthesizing and correlating the key conceptual areas of it, which can be considered the Contextualization of a Mobile Augmented Reality (MAR) authoring tool for the Italian Language Teaching and Learning (ILTAL), in the framework of an Entangled Pedagogy model and within the philosophical assumptions of a Post-digital perspective on technology and education. In this Mobile Assisted Language Learning (MALL) environment, the focus is on teachers' reflections with the situation, conceived in terms of teachers' values and purposes *in action* during MAR contextualization. This process, in turn, is understood in terms of tinkering, being this an adaptive, unplanned, open-ended, responsive process to what happens *in action*, with what teachers have at hand and during which goals cannot be fully specified in advance (Bardone et al., 2023).

The interrelationship among all the theoretical constructs here discussed has been the common thread implemented to develop the conceptual framework of the current study, which is here presented in Figure 14, where concepts are indicated through their respective acronyms previously presented in the course of this section of the thesis.

Figura 14

Conceptual framework of the research study

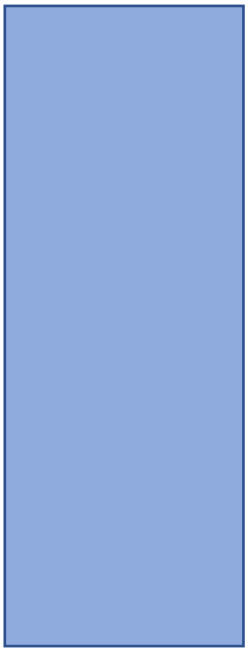


In order to explore teachers' values and purposes *in action* during the process of tinkering, the constructs considered are Teachers' Attitudes (TA) and Teachers' Pedagogical Beliefs (TPB), because, as Fawns (2022, p. 717) underlined in the EP model, 'educational values are beliefs about what matters within learning and teaching […]'. The TPB here considered are Perceived Usefulness (PU) and Perceived Ease of Use (PEU), being these two beliefs useful to observe and describe the ways in which teachers' attribute values to the entanglement of a technology in the classroom. Other internal factors considered in pursuing this same aim are the levels of Anxiety and Comfort (AC) when interacting with the MAR tool implemented for the study. Because of the entanglement of all the elements involved in a teaching-and-learning ecosystem with technology, in order to understand teachers' values and purposes in action External

Agents (EA) were considered as well, because of their capability to shape the teaching and learning ecosystem. Examples of these EA can be the type of infrastructures present in schools, the availability of technical support for teachers or time constraints, as well as limitations related to social, economic and cultural factors.

From the theoretical standpoint here presented, the research study moved to the definition of its objectives, of the research questions and of the methodology and methods implemented to achieve its aims, as it will be presented in the next section.

SECTION 2- RESEARCH METHODOLOGY



5. METHODOLOGICAL FRAMEWORK

5.1 Focus of the Study, Problem Statement, Aims and Research Questions

As largely discussed in the first section of the thesis, the rapid technological developments which we are living as a society nowadays are deeply impacting the educational field as well (Bates, 2019), with the appearance of new ideas on what constitutes a teaching-and-learning environment (Dron, 2022). Therefore, the field of education is facing important challenges and is continuously trying to adapt to new teaching-and-learning needs and ecosystems, while trying to understand the actual possibilities of ever emerging technologies to answer to the new educational needs. As one of these emergent technologies, AR can be implemented through handheld devices and can therefore be located in the wider framework of Mobile Learning, one of the main transforming areas in education (Morgana & Kukulska-Hulme, 2021). Because of the novelty of this phenomenon and for the fast expansion of MAR, always new developments and ideas are emerging, with a consequent need for exploring the possibilities in which MAR can be effectively implemented as an educational tool. Therefore, the issue from which this investigation is initiated is related to this current necessity of investigating the potentials of MAR contextualization in a number of social and educational contexts, in order to understand the teaching-and-learning needs related to its employment for language learning.

Henceforth, the purpose of the study is twofold. On the one hand, by exploring teachers' experiences of MAR contextualization for the ILTAL, it aims at understanding and describing teachers' purposes and values *in action*. On the other, considering the crucial role played by the socio-cultural and economic context when it comes to ETs implementation, as well as acknowledging the fact that more research concerned with teacher and student needs in a number of social and educational environments is needed, the research study aspires to be a contribution for the development of actionable knowledge regarding the entanglement of MAR for the Italian language classroom, by identifying a set of characteristics to prioritize for an effective contextualization of the tool in the ILTAL environments.

Considered the focus of the study and the related issues here discussed, as well as the number of gaps underlined in the literature review chapter, the Aims (A) of the research study and the Research Questions (RQs) were elaborated as follows:

A1: To explore teachers' experiences of Mobile Augmented Reality contextualization for the Italian Language Teaching and Learning in order to understand and describe teachers' values and purposes *in action*.

A2: To contribute to the development of actionable knowledge by identifying a set of guidelines for the contextualization of MAR for the ILTAL, based on the exploration of teachers' needs in action.

Overarching Question: Which main characteristics are to be prioritized during the process of Mobile Augmented Reality contextualization for the Italian Language Teaching and Learning according to teachers' perspectives?

RQ1. What values and purposes do teachers attribute to MAR for the ILTAL classroom?

RQ2. How do teachers describe the experience of designing MAR activities for the ILTAL with the Metaverse open-source authoring tool?

RQ3. What do teachers consider to be the main challenges and opportunities of the contextualization of MAR for the ILTAL classroom?

5.2 Methodological Considerations: Research Philosophy and Paradigm

This paragraph will describe the paradigmatic and epistemological assumptions of the methodological framework, in order to understand the reasons for the implementation of a totally qualitative approach, according to its main features. Considering the research agenda on educational technologies, Reeves (2006) identifies five different paradigms, being these the positivist, the interpretative, the critical, the heuristic and the design paradigm. According to Salas Campos & Umaña Mata (2011), a scientific paradigm is a set of theoretical and methodological principles which condition the vision of reality and, consequently, the perspective from which a researcher will approach the study of it. The present study embraces the assumptions of the interpretative paradigm as it can be implied by reflecting on the purposes of it, as well as on the nature of the RQs.

Also known as anti-positivism, interpretivism is opposed to the model of natural science, which sees knowledge as something directly accessible, as a truth to be discovered (Kivunja & Kuyini, 2017). On the contrary, according to an interpretative perspective, there are characteristics specific of the human experience which cannot be objectively accessed, but can only be subjectively experienced. Examples can be feelings, values, purposes, beliefs, emotions or socio-cultural factors (Kivunja & Kuyini, 2017). According to interpretivism, the cultural and personal baggage of researchers and participants cannot be ignored or removed as part of the research process. Conversely, researcher' role and the socio-cultural context of the cases under study are extremely valued, as from the perspective of this research study. The aim of it is to explore MAR contextualization for the ILTAL in in terms of teachers' values and purposes in action, in order to produce actionable knowledge based on teachers' perspectives. In considering teachers' relationships with MAR as the source of new knowledge, and aiming at exploring, understanding and describing what MAR contextualization means from the perspective of the participants, the researcher engaged in a completely interpretative activity.

As a research framed in the interpretive paradigm, the current study adopts a relativist epistemological position, considering knowledge accessible through the exploration and the description of different phenomena in context, where a number of

perspectives is to be considered in order to achieve a global narrative of the case, or the cases, under study (Carson et al., 2001; Flick, 2018). From an interpretative perspective, during the process of knowledge generation the researcher is embedded in the phenomena under investigation. Researchers emotional responses are part of the context and could, therefore, influence the object of study. Henceforth, the context is a crucial part of knowledge generation and for this reason the interpretative perspective consists of the necessary paradigmatic assumption for the current study. Besides, the description of the perspective of teachers in terms of what MAR contextualization means to them implies research of qualitative nature.

The first and main reason to use a qualitative approach relates to its relevance to the study of phenomena in the post digital era, during which, as largely discussed in the first chapter of the thesis, fast technological advances are enabling profound cultural, economic and social changes (Bayes, 2019; Fawns, 2018). The XX century was characterized by more or less fixed cultural, political and social structures, such as, for example, working, middle and upper class. In the contemporary globalized society the continuous diversification and individualisation of the ways of living has brought to the emergence of a variety of local, subcultural realities, a phenomenon known as *pluralization of life worlds* (Barira Bakhtawar, 2020; Flick, 2018). In such a pluralized society, where old fixed structures do not exist anymore and a variety of lifestyles is continuously emerging, researchers cannot explore reality with a traditional deductive approach. Consequently, researchers' theoretical knowledge of new phenomena, as it can be for example the contextualization of MAR for language teaching-and-learning, sometimes is too limited to begin with the generation of hypothesis to be tested during a research. Therefore, phenomena must be studied from the inside, with a bottom-up approach, in order to explore them and understand how a specific phenomenon is experienced by the community under study, which is actually who gives meaning to it.

> Rapid social change and the resulting diversification of life worlds increasingly confront social researchers with new social contexts and perspectives. As a result, their traditional deductive methodologies – deriving research questions and hypothesis from theoretical models and testing them against empirical evidence – are failing, due to the differentiation of objects. Instead of starting from theories

> and testing them, research is increasingly forced to make use of inductive strategies […]. Theories are developed from empirical studies. Thus knowledge and practice are studied as *local* knowledge and practices (Flick, 2018, p. 4).

In conclusion, the nature of contemporary society in terms of pluralization of life worlds requires researchers to investigate issues with an empirical, qualitative approach, considering that 'the era of big narratives is over: locally, temporally and situationally limited narratives are now required' (Flick, 2018, p.4).

The other reason for the adoption of a qualitative methodology for the current research study relates to the specific features of the methodological approach. Even considered the existence of multiple approaches and procedures to qualitative research, it is possible to identify some common features which allow to define qualitative methodology per se and not simply as a 'not quantitative' approach. These features are here considered because they consist of the standpoints from which decisions in relation to the aims, the RQs, the design, the methods and the procedures of the research study were undertaken. First of all and as discussed above, by approaching the natural world (and not by reproducing settings in laboratories) qualitative researchers intend to understand and describe behaviors and phenomena from the inside, by a direct exploration and analysis of individuals' or groups' experiences in their natural settings (Silverman, 2020). Interactions, conversations, documents such as field notes, audio and video recordings or pictures are collected directly in the field, in order 'to understand how people construct the world around them, what they are doing, how they are doing it or what is happening to them in terms that are meaningful and that offer rich insights' (Flick, 2018, p. 4). Afterwards, the material collected is analyzed and interpreted in order to construct narratives, which enables the development of more or less generalizable models and theories through which understand and describe phenomena in context (Creswell & Plano Clark, 2018; Priya, 2021; Silverman, 2020).

Another main feature of the qualitative methodology which is relevant in the context of this research study relates to the researcher' role. Because qualitative researchers are interested in directly exploring naturally occurring experiences in context, they do not test pre-determined hypothesis, but they are open to develop, refine, adapt and change concepts, methods and approaches as the data collection process unfold,

continuously adapting to the open dynamics and peculiarities which the study of phenomena in context implies (Silvermann, 2020). Henceforth, in qualitative approaches researchers bring themselves to the research process, they are part of it simply with their presence as researchers, on the one hand, and, on the other, with their experiences in the field, as in the case of action research studies for example. In other words, a qualitative approach incorporates researcher' reflexivity in the research process because researchers become members of the case under study (Pryia, 2021). In conclusion, the crucial role played by the researcher in qualitative studies is another valuable reason to adopt this methodological approach for the present research, mainly for the relevance given to reflexivity during the process of data analysis, as it will be seen afterwards, as well as for the level of engagement of the author of this study in its development.

In considering the features of qualitative research, it is pertinent to discuss aspects related to the issue of the quality of it, also considering the fact that they apply to case study as well (Priya, 2021), being this the research method selected for the development of the research study, as it will be described afterwards. It is worth underling that the author of this study intentionally adopts the terminology of Guba & Lincoln (1994), using the term 'quality' of qualitative research, instead of reliability and validity which relates more to a quantitative research framework. According to the scholars, the main criterion to determine the quality of a qualitative research is the 'trustworthiness' (Flick, 2018, p. 548), which can be achieved through the criteria of credibility, dependability, transferability and conformability. According to (Stake, 1995), in order to achieve the trustworthiness of a study there is also another aspect to be considered, being this the perspective of the readers of it. If researchers adequately describe methodology and methods, reporting details about their decision-making during the entire research process, the readers will be able to determine the trustworthiness of the results (Stake, 1995). The criterion of credibility guarantees that results are grounded in the data and that are as much adjusted on the reality as possible (Guba & Lincoln, 1994). It is achieved when the research is conducted according to the canons of good practice, through activities such as 'peer debriefing' (Flick, 2018, p. 548) or member checks.

The criteria of transferability will be largely discussed in the next paragraph in relation to the method implemented, and it relates to the possibility of generalizing and,

therefore, to the fact that findings can be transferred to other cases (Flick, 2018). According to Guba and Lincoln (1994), transferability can be achieved by a concept that (Geertz, 1988) called 'thick description', consisting in a detailed and information-rich description of a phenomenon in order to provide other researchers with 'a database for making judgments about the possibility of the transferability of the findings to other milieux' (Priya, 2021, p. 9). However, because a Reflexive Thematic Analysis (RTA) approach by Braun & Clarke (2022) is adopted for the data analysis, a clarification is worth doing here. The authors explain the concept of "thick description" as a deep interpretative and contextualized analysis. Nevertheless, they recommend not to use the term "thick description" or to aim for it as a named-practice. On the contrary, they suggest to conceive the process as a manner to make the reader "able to imagine or feel what's described in the data" (Braun & Clarke, 2022, p. 140). Therefore, thick description from the RTA perspective consists of a contextualization of data extracts, where information regarding the physical context or the reactions of the intervieews, for example, are also provided. The achievement of a 'thick description' is, therefore, conceived in these terms in the context of this study, as it will be seen in more details in the results and discussion sections.

The other criterion to be considered in order to ensure quality is the dependability. It refers to the consistency of findings and it is assessed through a process of auditing. In order to achieve it, all the decisions undertaken for the development of the research process must be clearly outlined, such as the identification of the role of the researcher, a detailed description of the informants, a description of the techniques of data collection, storage and analysis and so on (Guba & Lincoln, 1994; Flick, 2018; Priya, 2021). The last criterion is conformability, which refers to the level of objectivity of the research study, achievable through operations such as checks with participants, audiovisual data collection, triangulation or previous explanation of the researcher's position (Guba & Lincoln, 1994; Flick, 2018). All the criteria here discussed are considered to ensure the quality of the current study and the manner in which they are applied to it are presented during the developing of this, and of the following sections of the thesis.

In conclusion to the paragraph and acknowledging the difficulties of straightforwardly defining qualitative research because of the multiplicity of approaches

and procedures it can contain, a definition of the methodology is here presented, since it is considered exhaustive to resume the reasons for the adoption of a qualitative approach for the current research study:

> Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them (Denzin & Lincoln, 2011, p. 3).

5.3 Research Strategy and Design: Case Study

After presenting the paradigmatic and epistemological stances as well as the methodological approach of the research study, this section will describe the research method implemented and present the research design. Considering the aim and the collaborative nature of the study, Action Research could be considered the most appropriate method for its participatory nature and its practical focus. The Action Research framework would enable teachers to actively collaborate in the research development with the design of the MAR activities, as well as with their insights and actions in classroom. However, even though the research study derived from the experience of the investigator as an IL teacher and although the presence of a strong collaboration among the teachers involved and the researcher, the latter did not participate as an active member of the teachers' community, neither actively designed or implemented the MAR activities, but only supported teachers during the process of MAR contextualization for the ILTAL. Henceforth, Action Research cannot be adopted as a research method for the current study. On the other hand, Holmberg (2014) suggests a reflective Design Based-Research (DBR) approach as a valuable method to learn

regarding educational technology contextualization from the perspective of teachers' reflections with the situation. Nevertheless, as the scholar underlined as well, together with the difficulties related to the attempt of understanding teachers' implicit knowledge development *in situ* and reflection-in-action with a DBR approach, the number of challenges inherent in the approach itself should be considered. Moreover, because of the time and access-to-the field constraints experienced during the development of the study and considered the amount of time required by the iterative nature of the DBR, this approach could not be considered viable for the present research study either.

Consequently, reflecting on the fact that the case study enables researchers to deeply focus on a specific case (or on a number of cases) in order to retain a holistic-real world perspective on the complex phenomenon under exploration (Yin, 2018; Priya, 2021), it was adopted as the research strategy for the study. A main advantage of the case study is the possibility to employ any method of data collection suitable to the purpose of conducting an in-depth exploration of a case in its natural context, as long as the research is developed in a feasible and ethical manner (Priya, 2021). Moreover, the flexibility allowed by the case study design makes it particularly useful in exploratory contexts and, therefore, suitable for the current research according to its aims, to the nature of the research questions, as well as to its paradigmatic and epistemological framework.

Allowing a detailed exploration and an in-depth description of a particular issue, the case study enables an enhancement of the value of the context, which is particularly relevant in the scope of the present study, in particular, and in the field of qualitative research in general, as discussed in the previous paragraph (De Benito Crosetti & Salinas Ibáñez, 2016). Another reason to select the case study as the appropriate research strategy for the present investigation, consists of the fact that most of

> 'the current qualitative research is based on case studies or a series of case studies and often the case (its history and complexity) is an important context for understanding the issue that is studied' (Flick, 2018, p. 4).

On this interconnection between the phenomenon (or the case) under exploration and its context is built the definition of case study adopted in this investigation. According to Yin (2018), a case study is an in-depth empirical inquiry aimed to understand a real-world contemporary phenomenon, where the boundaries between the phenomenon and its

context are not always visible and the same process of understanding involves contextual conditions pertinent to the case. Considered the crucial role played by the social, economic and cultural context in the current research, this definition is considered particularly suitable for the purposes of the study. Yin (2018) identified three types of case study: Descriptive, Explanatory and Exploratory. In the first case, the purpose is to 'describe' a phenomenon in depth in its natural context. This type of case studies are implemented mainly in sociology and anthropology. Explanatory case study try to identify causal factors to explain phenomena and they are aimed at understanding why certain events occur or do not occur. Finally, Exploratory case study have as an objective the analysis of phenomena by a depth exploration of them, as in the case of this research which, therefore, falls under this last category.

As seen before, to ensure quality in the framework of the case study it is fundamental a clear definition of the case, or the cases, under study (Flick, 2018; 2018; Silvermann, 2020). Regarding this investigation, the cases under study to explore the phenomenon of MAR contextualization could be various, since each school could be considered as a single unit of analysis. Henceforth, a multiple-case study design could be implemented. However, it is not in the interest of the present research to identify similarities and contrasts among the various schools involved (Yin, 2018). Moreover, multiple-case study designs are more time consuming, they demand for more resources and effort from the researcher and from all the stakeholders involved (Yin, 2018). Compared to a single-case study, a multi-case study requires more data collection, analysis and synthesis, which can be challenging for the researcher, especially if the cases are complex, diverse, or distant. Besides, from a theoretical perspective, already in 1992, Ragin underlined that considering single-case studies inferior to multiple-case studies is misleading, because even 'single-case study are multiple in most research efforts because ideas and evidence may be linked in many different ways' (Ragin & Becker, 1992, p. 225). According to (De Vaus, 2001, p. 220) the 'unit of analysis' in a case study research can be an individual, a family, a household, a community, an organisation, an event or even a decision'. Henceforth, the unit of analysis for the current single exploratory case study is conceived

as the community of the IL teachers in Argentina who decided to participate in research on their experience of MAR contextualization.

After reflecting on the advantages and on the reasons to conduct case study research, there are some issues related to the research strategy which it is worth attending. The main critiques to case study basically relates to theory development, generalizability and the presence of bias related to the level of engagement of the researcher. Regarding the first issue, the positivist perspective which guided the research community for a long time always considered theoretical context-independent knowledge more valuable than context-dependent, concrete, practical knowledge (Flyvbjerg, 2006; Silverman, 2020). As previously discussed, the breaking of the fixed, monolithic models of the XX century brought to the emergence of a plurality of subcultures and lifestyles, which had consequences on the work of researchers as well (Flick, 2018). Therefore, if reality is made of a plurality of facts and contexts, the only way we have, as researchers, to access knowledge is by concretely and practically approach such realities about which we have limited information.

Flyvbjerg (2006) considers that in social sciences predictive theory cannot exist, because it relates to 'human affairs' (2006, p. 223) and it is therefore a branch of science able to produce exclusively concrete, context-dependent knowledge. However, the scholar underlines, on the one hand, the fact that the absence of 'hard' theories does not exclude the possibility of learning and, on the other, the capability of case study as a research strategy to achieve this aim. Furthermore, already in 1975 Campbell, moving away from his previous denigration of case study as a research strategy highlighted that 'qualitative common-sense knowing' consists of 'the only route to knowledge— noisy, fallible, and biased though it be' (2006, pp. 179-191).

The discussion on theory development is connected to another critique to case study, being this the issue of generalization on the basis of a single case. Several proposals have been advanced in order to conceptualize the matter of generalization in terms more compatible with the principles of qualitative research, in general, and of case study, in particular (Flick, 2018). One suggestion relates to the concept of transferability, which starts from a consideration of the contextualized nature of the qualitative inquiry.

> ‘With transferability, the core concern is not to generalize to an abstract and decontextualized population, but to determine whether the findings obtained for one instance or set of instances in one specific context also apply to other instances in a different context.’ (Flick, 2018, p. 4).

Specifically, in relation to case study this means that it is possible to generalize only if a number of case studies on a same phenomenon is conducted (Yin, 2018; Priya, 2020). Yin (2018), for example, argues that it is not in the interest of a case study research to generalise over a population, but it is possible to examine the validity of a case study, and therefore to generalize, through its replication. Priya (2020) underlines how a single-case study can only be implemented to generate hypotheses and not for theory building, because the hypotheses generated should be tested afterwards in similar cases in order to move towards theory building or generalisation. Moreover, in conceiving generalizability in terms of replicability, it is fundamental to consider that the extent to which findings could be transferred from one case to the others is related to the degree of similarities of the respective contexts (what Lincoln and Guba, 1994 called the fittingness of contexts). This is related to another idea of generalization, being this the possibility to generalize according to the type of case and, therefore, to the way in which it is selected.

However, the author of this study does not consider any of the suggestions above adapt for the current study and embraces the perspective of scholars such as Flyvbjerg (2006) or Silvermann (2020), according to which generalization is overvalued and it should be conceived as a weaker concept of what actually is. Silvermann (2020) underlines how the idea that the knowledge deriving from a research study is more valuable if the researcher is able to move away from his/her specific case as much as possible it is a common mistake in qualitative studies, since ‘such a view overlooks a key advantage of qualitative research – its ability to give us an insight into local practices’ (Silvermann, 2020, p. 74). Gobo (2004) suggests how the statistical tests commonly implemented in quantitative studies are not actually able to give any information regarding how strong a relationship found in a sample is in the wider population. Therefore, ‘generalization is a problem for quantitative researchers’ (2004, p. 445). However, Flyvbjerg (2006) underlines the fact that the overevaluation of generalizability is true both for social and natural sciences. The scholar presents an interesting example,

reflecting on how the rejection of Aristotele's law of gravity from Galileo was not based on a large number of observations conducted across a range of contexts, but on the strategic and careful choice of the case, which consisted of the materials used (metal and feather).

> Galileo's experimentalism did not involve a large random sample of trials of objects falling from a wide range of randomly selected heights under varying wind conditions and so on […]. Rather, it was a matter of a single experiment, that is, a case study, if any experiment was conducted at all. […] Galileo's view continued to be subjected to doubt, however, and the Aristotelian view was not finally rejected until half a century later, with the invention of the air pump. […] What is especially worth noting in our discussion, however, is that the matter was settled by an individual case because of the clever choice of the extremes of metal and feather. One might call it a critical case; for if Galileo's thesis held for these materials, it could be expected to be valid for all or a large range of materials. Random and large samples were at no time part of the picture. Most creative scientists simply do not work this way with this type of problem (Flyvbjerg, 2006, p. 226).

Henceforth, according to Flyvbjerg (2006), the fact that a case study is not generalizable does not mean that the case is not contributing to knowledge development. If the characteristics of the postmodern and post-digital society previously discussed in this thesis are considered again in relation to this topic, generalizability should not even be an issue, because of the peculiarities of each single case and of the consequences of this on the research field. It is certainly possible to generalize on a specific phenomenon by conducting a number of case studies on it, as in the transferability perspective previously presented, but this is not in the interest of the current investigation. According to the perspective of the author of this study, if a case study is properly conducted it is able to generate unique insights on a specific phenomenon by exploring it in depth, because, as Gobo (2004, p. 442) highlighted, 'many of the most important, theoretically productive qualitative research studies were based on single cases'. Of course, this discussion does not mean that case study is always the most suitable research method or that procedure like random sampling are not useful at all for scientific development, but

what is highlighted here is the fact that formal generalization is simply an instrument among others to be implemented in order to gain knowledge.

> That knowledge cannot be formally generalized does not mean that it cannot enter into the collective process of knowledge accumulation in a given field or in a society. A purely descriptive, phenomenological case study without any attempt to generalize can certainly be of value in this process and has often helped cut a path toward scientific innovation. This is not to criticize attempts at formal generalization, for such attempts are essential and effective means of scientific development; rather, it is only to emphasize the limitations, which follow when formal generalization becomes the only legitimate method of scientific inquiry' (Flyvbjerg, 2006, p. 227).

Another common critique to case study relates to the fact that the high level of subjectivity of the researcher may result in internal bias. Therefore, there is an idea that as a research strategy case study tends to confirm researchers' preconceived views and assumptions, loosing scientific value (Flyvbjerg, 2006; Silvermann, 2020). However, it must be underlined that case studies have their own internal rigor, which may be less strict than the rigor of quantitative methods because case study allows more space to researcher reflexivity (Flick, 2018). On the other hand, it must be recognized that bias are not simply related to case study or qualitative research, but, as already Francis Bacon (1853) underlined, are part of the human nature:

> The human understanding from its peculiar nature, easily supposes a greater degree of order and equality in things than it really finds. When any proposition has been laid down, the human understanding forces everything else to add fresh support and confirmation. It is the peculiar and perpetual error of the human understanding to be more moved and excited by affirmatives than negatives (1989, p. 46).

Consequently, according to this perspective the issue of bias related to the degree of subjectivity of a researcher should apply not only to qualitative research strategies such as case study, but also to quantitative methods. 'For example, the element of arbitrary subjectivism will be significant in the choice of categories and variables for a quantitative

or structural investigation, such as a structured questionnaire to be used across a large sample of cases' Flyvbjerg (2006, p. 235). Henceforth, the issue of bias related to subjectivity can be overcome by reflecting on the nature of qualitative inquiry and on the related researcher' role, which includes space for reflexivity as in the case of the present study and as will be largely discussed in the data analysis section.

After reflecting on the characteristics of the case study, on the reasons to adopt it for the current research, as well as on the ways in which common critiques to it are overcome in the framework of this study, the paragraph concludes with a presentation of the research design. Ragin & Becker (1992, p. 191) elaborated a comprehensive and widely used definition of research design as

> 'a plan for collecting and analysing evidence that will make it possible for the investigator to answer whatever question he or she has posed. The design of an investigation touches all aspects of the research, from the minute details of data collection to the selection of the techniques of data collection'.

According to Yin (2018, p. 28) a research design is a 'craftwork', while Flick (2018) recognizes two possible ways of addressing research design in qualitative studies. A researcher can choose among basic models of qualitative research designs and select one according to his/her own study (Creswell & Plano Clark, 2018), or the components for constructing a research design are listed and discussed by the researcher him/herself in the development of his/her own research. Again, Flick (2018, p. 98) identifies the following main components for constructing a qualitative research design:

- The goals of the study
- The theoretical framework
- Its concrete questions
- The selection of empirical material
- The methodological procedures
- The degree of standardization and control
- The generalization goals
- The temporal, personal and material resources available

Some of this components were already discussed in this thesis, while others will be presented in more details afterwards in the development of the following sections. As a conclusion to the present paragraph, Figure 15 presents the overall research design, while Figure 16 shows the timetable of the entire research study. In Figure 15 it can be observed a detailed representation of the specific actions conducted during the 3 main phases of the research study, which are discussed in details throughout the entire thesis. The Figure 15 shows the different steps of data collection as well. The MAR platform implemented is described in details in the next paragraph. However, in this context it is fundamental to mention that between Step 1 and Step 2 of the data collection phase (Phase 2), teachers received 11 tutorials developed by the author of this study in order to make the MAR platform more accessible to the participants, since it did not present tutorials available in languages other than English. Through the 11 short tutorials a sample activity was elaborated. As previously mentioned in this thesis, the MAR platform used is not working anymore and the activity is no longer available. However, it is still visible in its final version from the 'software view' (and not from the App) by accessing the last of the 11 tutorials. For completeness, the link to all the tutorials realized is reported in the endnote[10].

[10] https://youtube.com/playlist?list=PLd0IFEb24E7aAAOAimK3btC9zLXaApPyQ

Figure 15

The research design

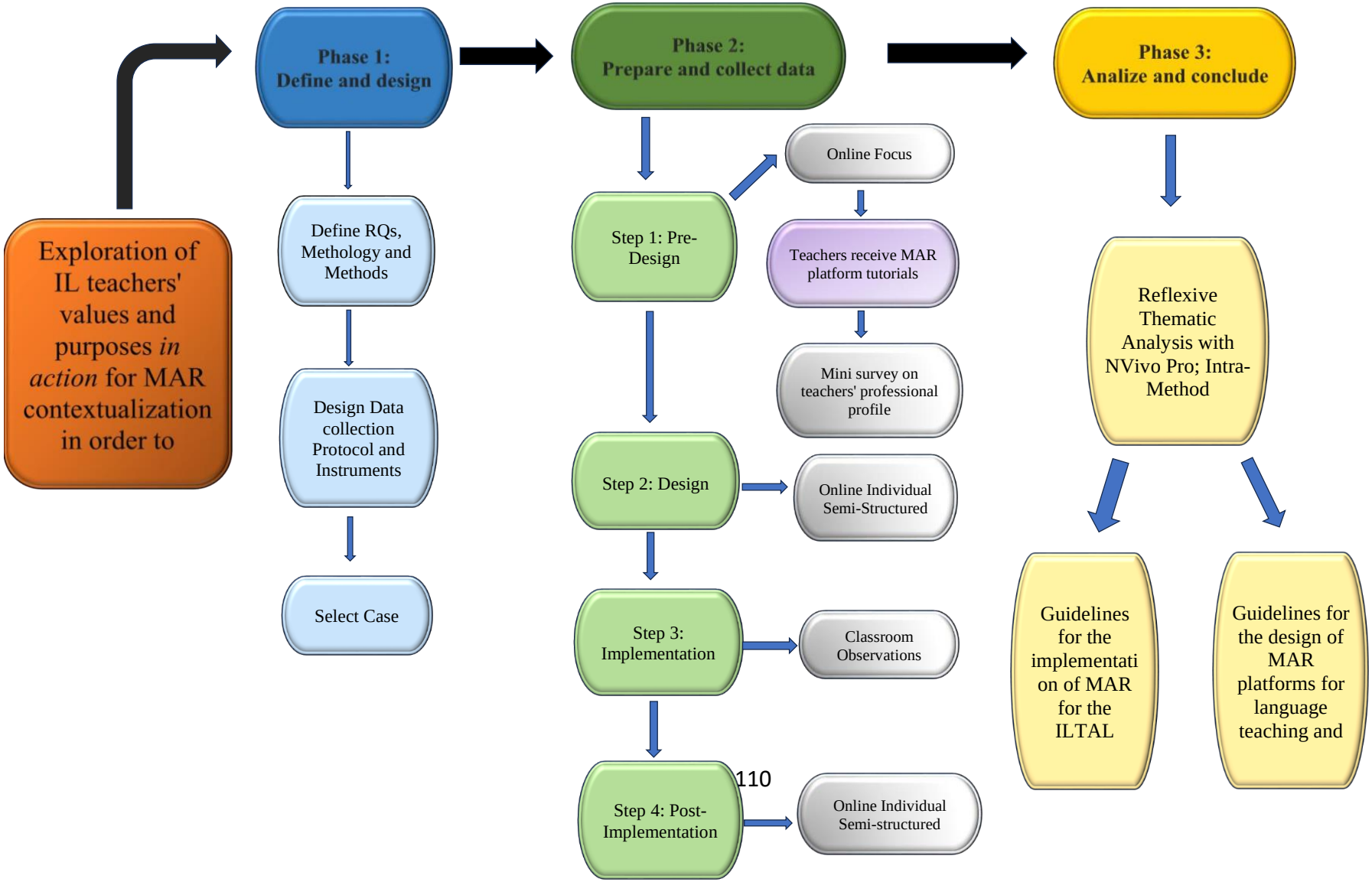
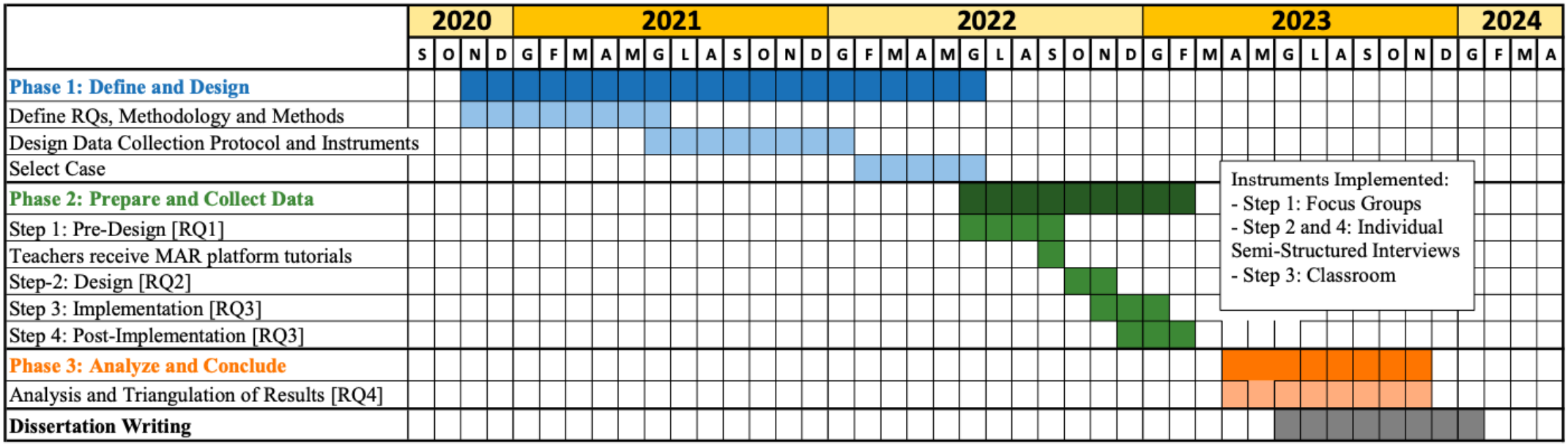


Figure 16

Timetable of the different phases of the study



5.4 The Mobile Augmented Reality software implemented: the *Metaverse*

The literature review section of this thesis presented the different characteristics of AR software (location or image based, marker or GPS based, etc.). Having those features in mind, this paragraph describes the MAR authoring tool implemented for the research study, specifying the reasons for its selection among other tools available. Unfortunately, an enormous issue which occurred with the platform and that completely affected the entire research study must be underlined before describing the software. During the data collection phase, sometimes the App was not working properly and it was necessary to restart the activities many times before the students were able to access them. Nevertheless, considering time availability and the phase in which the research already was, it was not possible to change the platform for the purposes of the study. Therefore, the author of the investigation decided to keep working with the Metaverse even if it was not running perfectly. Fortunately, teachers were able to design their activities and students to access them. Therefore, the research study was developed without big problems, other than the necessity for some students to restart the App when a numerous group was working with it at the same time.

Unfortunately, this and other types of problems have grown in time, with the App working slowly and badly increasingly every time that the researcher was accessing the activities developed by the participants in order to analyze them (after the implementation in classroom and the data collection phase, fortunately). Once started to write the thesis and went back to retrieve the activities in the database in order to insert examples in the dissertation, the researcher realized that the software was completely abandoned, that the activities did not work anymore, that they were not accessible from the App and that they all disappeared from the database. The pictures presented here as examples of activities are screenshots taken from the author of the study before the issue occurred. For this reason they refer only to one activity, being this the activity for which some screenshots were taken during the design phase of the research. For the same reason, it was possible to retrieve only 4 QR codes and not the total of the QR codes of all the activities designed by the teachers. However, even though the QR codes retrieved are reported here as examples, the related activities are not available anymore.

It is easy to understand the extent to which this issue affected not only the future direction of the study, but also the researcher motivation. However, the issue also underlines the importance of carefully considering the characteristics of the context when conducting research in the field of educational technologies. Because of the limited economic resources and time availability for the PhD project (which in Italy must be completed in 3 years), the researcher, for example, did not have the possibility to acquire a sophisticated AR platform and, therefore, to have developers in support to her work. Moreover, changing the platform at the data collection phase would have deeply affected the research, requiring time to learn its features or requiring coding skills, which the majority of AR platform demand, which both the researcher and the participants would have had to learn. As it will be discussed in this paragraph, the main reasons to choose the Metaverse were the fact that it was available as an open source tool online and its intuitiveness. Even with the number of difficulties here reported, a description of the platform and of the features implemented during the study by the teachers who learned to use it are presented.

The open-source platform Metaverse[11] is designed to create educational MAR activities with a laptop through an intuitive studio editor, where users can introduce a number of contents in pre-designed templates called 'scenes', as observable in Figure 17, which shows the beginning of an activity. By clicking on the different sections of the templates, which recall the screen of a mobile device, teachers can add characters, texts, audio or video files, animations, YouTube or web pages, as well as audio and video recordings. Characters, animations and audio contents are available in the studio database, as it can be observed in Figure 18 and 19, but teachers can also import users-created contents if they wish to, as well as integrate a Google AI service. In Figure 21, for example, the little Dante Alighieri characters in the scenes were uploaded to the Metaverse database by the teachers who participated in the study.

[11] https://studio.gometa.io

Figure 17

A pre-designed template of a 'scene' in the Metaverse Studio software

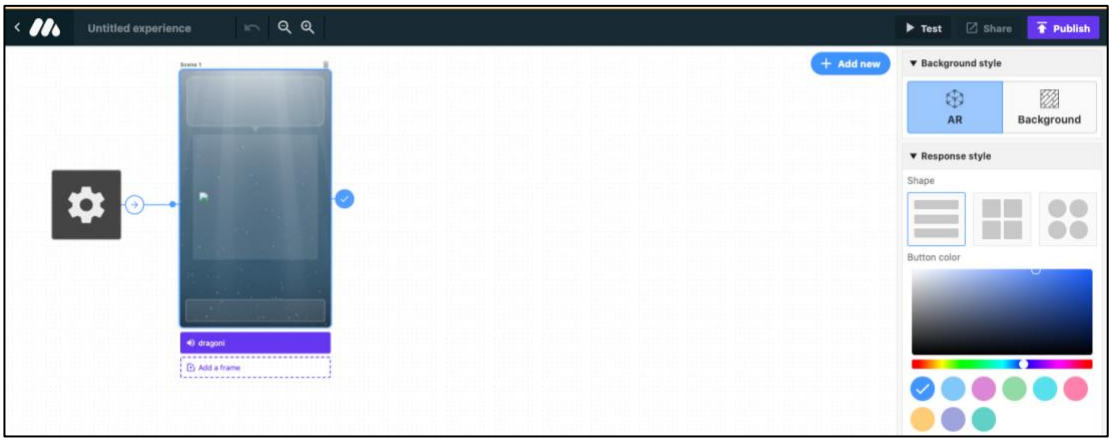


Figure 18

Examples of characters and animations in the Metaverse Studio software database

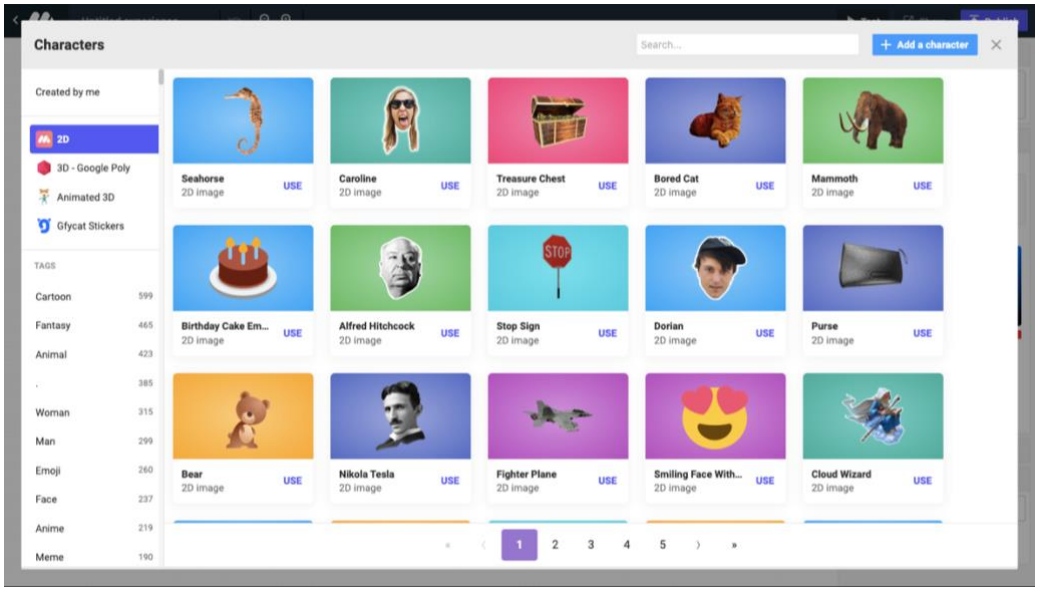
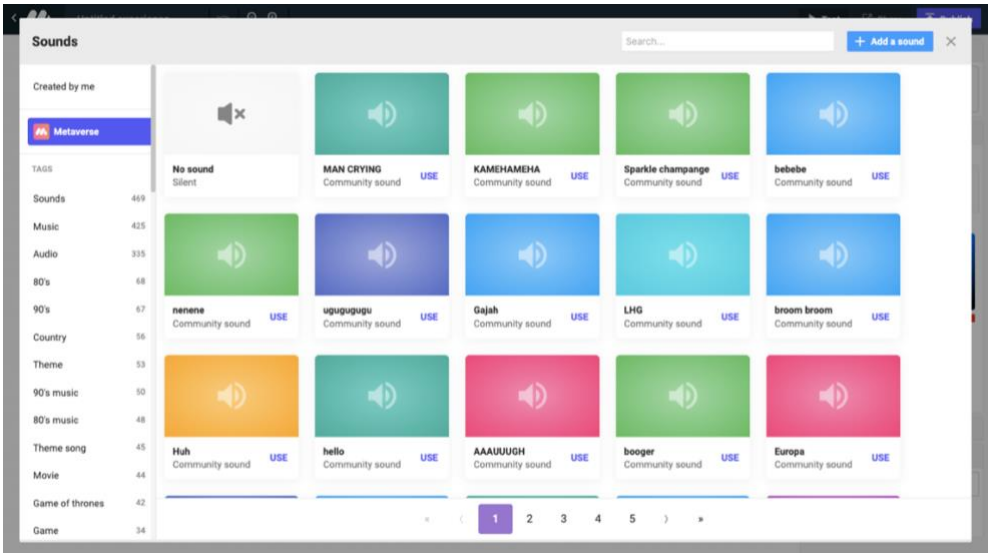


Figure 19

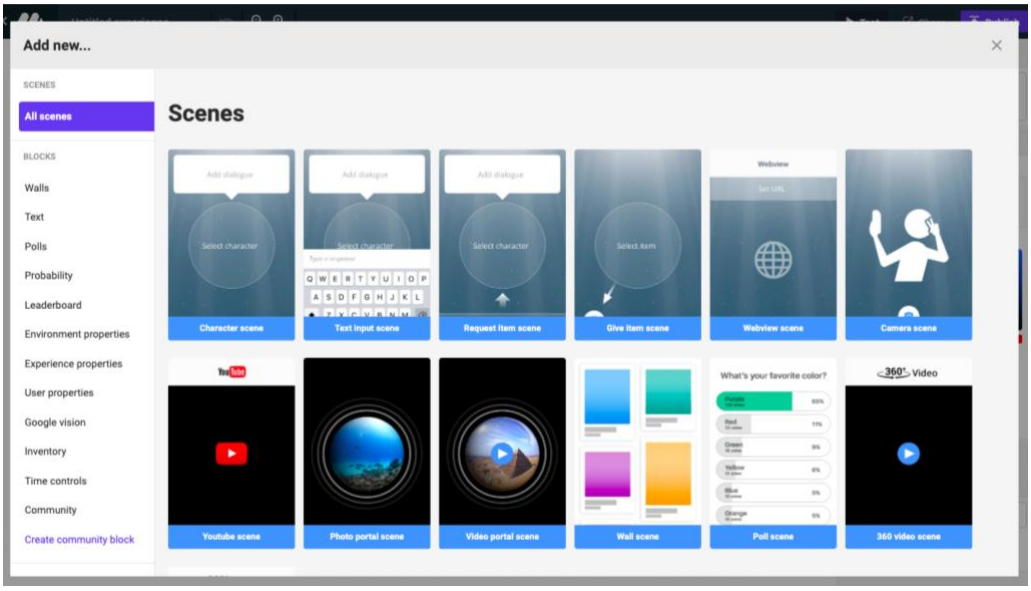
Examples of sounds in the Metaverse Studio software database



As previously underlined, scenes can be of different types. They can simply present a character, they can be multiple choices, video scenes, text or image input scenes, collect item scenes, portal scenes etc., as showed in Figure 21.

Figure 20

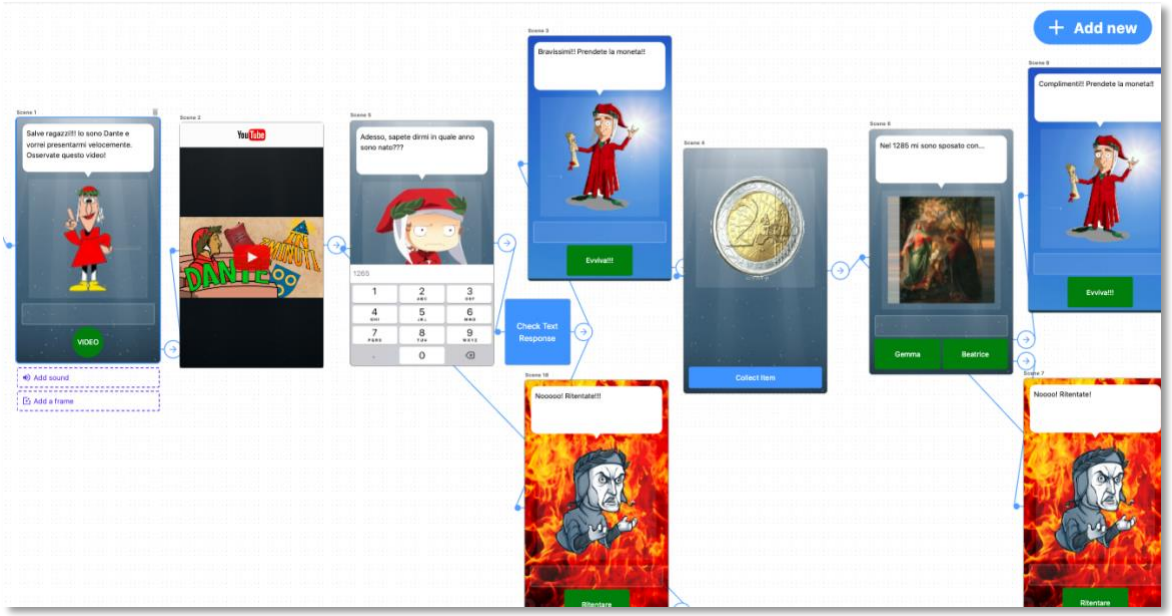
Examples of the different types of scenes available in the Metaverse Studio platform



Once a scene is ready, it is linked to other scenes afterwards in order to create a complete MAR experience (Figure 21), which contains part of a MAR activity created to show the platform to the teachers' participating to the research study.

Figure 21

Editing view of the scenes of an activity in the Metaverse Studio software



As it can be observed, scenes can be simply connected to one another, as well as linked with a more sophisticated connection, as in the case of 'text-input' or 'object recognition' scenes. Thanks to this feature it is possible to ask students to take photos of objects or to insert texts that are checked during the experience to determine if they actually matched the expected object or text and, therefore, if students can continue with the activity and go forward to the following scene. The 'text input' scenes were employed largely by teachers during the research study. An example of a text-input scene is reported in the figures below. In Figure 22 it is possible to see a text input scene as designed in the editor of the studio platform, while in Figure 23 it is possible to see the same scene in the way

in which it appears when accessed through the App in order to experience the MAR activity. As observable in Figure 22 and 23, after watching a video, students have to answer to the question related to the year of death of Dante Alighieri. After inserting the year, they can collect a 2 euro coin if their answer is correct, otherwise they will meet a furious Dante among the flames of the *Inferno* which will give them another possibility to try again. The number of possibilities is unlimited and if they cannot answer correctly, they can always go back and watch the video again. The little blue box which says 'Check-Text Response' in figure X contains a digital code which allows the operations described above, but does not require teachers to be able to code themselves.

With the Metaverse teachers only have to choose among a number of boxes able to connect scenes according to the aim that they want to achieve. Therefore, in order to elaborate a complete MAR experience, the user is not required to possess coding or programming skills, as in the case of other available platforms such as *Aris, Zapworks* or *Minsar*. Considered the issue of the lack of digital skills for teachers largely discussed in the first section of the thesis, this characteristic of the Metaverse consisted as a main reason to select the platform among others. Another advantage is related to the fact that differently from the *Metaverse*, which is also freely available for both Android and iOS devices, the platforms mentioned above have more elevated costs and longer learning curves which could have resulted in a more time consuming and cognitively overloading experience for the teachers participating in the research study. Moreover, the specific characteristics of the scenes, as in the case of inserting a text or listening to an oral text (for example a YouTube video), are considered particularly relevant for a language teaching and learning environment.

Figure 22

Example of a text input scene as designed in the editor of the Metaverse studio Platform

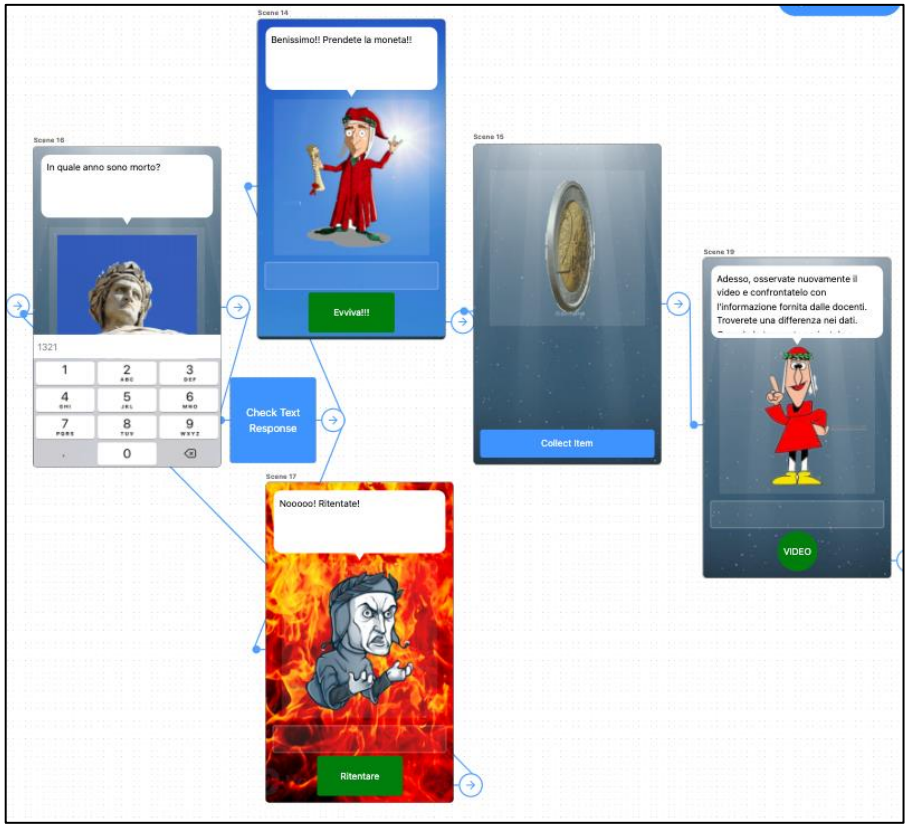


Figure 23

Example of a text input scene as accessed with the Metaverse App

When the activity is completely designed, a Quick Response (QR) code is generated to test and access it through the related mobile *Metaverse* App. Consequently, it is easier for teachers to make the experience available, since they can show the QR code on a screen or they can simply print it and ask students to scan it. Differently from other tools such as *Quiver* or *HP reveal*, where to access an activity it is necessary to link the experience to a GPS or physical trigger such as a specific object, the Metaverse enables much more flexibility in the fruition of the activity. However, the platform does provide the possibility to link an activity to a location-based trigger, enabling users to choose if they intentionally want to include the environment as a fundamental part of the learning experience. Nonetheless, the implementation of this possibility requires more sophisticated skills from the user.

Examples of the way in which MAR activities are accessed and experienced by students through a QR code is given in Figure 24, where the QR code presented relates to four activities designed by teachers during the development of the research study. It is interesting to underline the fact that all the teachers who participated in the study used the

QR codes to make the experience available. Moreover, as it will be better described in the analysis section of the thesis, they created scavenger hunts by pasting the QR codes in different sites of their schools and having students look for them. Unfortunately, as previously underlined in the introduction of the paragraph, the activities linked to the QR are no longer available.

Figure 24

Examples of QR codes generated by the Metaverse in order to access an activity

A last reason to choose the Metaverse is the fact that it contains another engaging feature, particularly for secondary school students, consisting of the possibility to create social profiles in the *Metaverse* App, where they can share contents like pictures, selfies, polls or audio registrations generated during an experience. With a camera scene (check Figure 20 above), for example, teachers can ask students to take a selfie once they have

completed part of an activity. Experiences can also be shared and their source can be made public, making them freely available in the *Metaverse* repository.

In conclusion, the *Metaverse Studio Gometa* resulted to be the most suitable open-source authoring tool for the design of MAR experiences in relation to the aim and the characteristics of the research study here presented. On the one hand, because of its user-friendly interface and because it is freely available both for Android and iOS devices. On the other, for the number of features discussed in the present paragraph, which make the App easy to work with, as well as engaging for students and particularly suitable for a language teaching and learning environment.

Nonetheless, as largely discussed in the introduction of the paragraph, the Studio software and the Metaverse App are no longer available. All the activities designed by the author of this study as well as the activities developed by the teachers who participated in it, the students' selfies and contents disappeared from the database. This enormous issue, which consists of a big limitation for a research study, however, must be considered as an important information for future researchers that will have to conduct a study with limited resources. If they are not able to acquire a MAR platform for their study and they are not supported by a team of developers, then the selection of a freely available MAR App should not only be carefully conducted, but also considered as an enormous risk for the purposes of the research study. Moreover, the issue underlines once again the crucial role played by the context when it comes to educational technologies implementation and research (Fawns, 2022).

5.5 Context and participants

As already discussed in the literature review section of this work, the high numbers of IL courses in Argentina is due to the migrant history that connected the Country to Italy (Patat, 2004; Vedovelli, 2021; Coccia et al., 2022). As previously described, the numbers of students, schools, universities, private institutions and courses offered by the Italian Institute of Culture (IIC), which is responsible to maintain and spread the Italian language and culture locally, are among the highest in the world (See chapter 4). However, numbers related to IL teachers are difficult to find. Even though the researcher tried to

collect information regarding the number of IL teachers in the territory through the embassy and the consulates in Argentina, it was not possible to collect an exhaustive data because not all the institutions reached by email answered. However, at least for 2021 and for the provinces of Buenos Aires, Córdoba, Tucumán, Santiago del Estero, Salta, La Rioja and Mendoza there are 138 IL teachers[12].

Considered these numbers and the cultural and economic role which the ILTAL plays in Argentina, as well as the backdrops from the literature related to the need of research studies in different cultural and social backgrounds, as well as on languages other than English, the Country is considered a significant context for the study. In line with the qualitative nature of the research study, participants were selected through a purposive sampling criteria, chosen as a strategy to select participants for the possibility that it enables to identify information-rich cases for the phenomenon of interest (Schreier, 2018). Because the exact meaning of information-rich cases, 'and therefore the selection of a specific strategy, depends on the research question and on the goal of the study' (Schreier, 2018, p. 6), the purposive sample is considered to be coherent with the objective of the research study, which is to gain in-depth, detailed information on the experience of the participants during the process of MAR contextualization for the ILTAL. Furthermore,

> Purposive sampling allows us to choose a case because it illustrates some feature or process in which we are interested. However, this does not provide a simple approval for any case we happen to choose. Rather, purposive sampling demands that we think critically about the parameters of the population we are interested in and choose out sample case carefully on this basis (Silverman, 2020, p. 63).

Therefore, participants were selected among private secondary level institutions where Italian is included as a second language in the school curriculum and taught for at least four hours per week. The reasons for selecting private schools with a specific number of hours per week can be understood in relation to the socio-economic peculiarities of the broader cultural context. Having worked as an IL teacher for almost six years in Argentina, the researcher could observe that teachers were underpaid and that they had to

[12] This data were provided to the researcher by email by the Italian consulate of Córdoba

work in a number of different institutions in order to reach an average salary. This fact will be particularly relevant for the data analysis phase of the study, and for this reason it will be discussed afterwards in this work as well. However, it was also important to reflect on this issue during the selection of the participants for the research study. Therefore, the researcher realized the extent to which this socio-cultural aspect could have negatively affected the data collection process and for this reason the selection of private schools, where teachers are committed for at least four hours per week, was considered a strategical decision to positively affect the overall research study, since higher salary (being private institutions) and less working hours were expected to result in a higher willingness and availability to participate to the study.

Furthermore, the researcher also reflected on the fact that, because the study implies the use of mobile phones to access the MAR activities, the economic status of students had to be considered as well. For this reason public schools were excluded from the selection of participants, since many students in those contexts come from low-income backgrounds with a number of social issues. Henceforth, it would have been complicated to implement the activities in the classrooms. Furthermore, many public institutions in Argentina do not have proper infrastructures, like the availability of internet connection. A last category of institutions excluded during the process of purposively selecting participants for the study was the one of the *equal schools*, because of the specific characteristics of their curricula and for the school policies, which are completely different from private institutions since they respond to the Italian Ministry of Education as well. Finally, the choice of working with secondary level classes is due to the consideration of the gap, already discussed in the previous chapter, related to the need for more studies at this level of education (Parmaxi & Demetriou, 2020).

Considered all the sampling criteria discussed so far, 10 institutions were selected with the support of the Italian consulate in the areas of Buenos Aires, Córdoba and Santa Fe, being these the main regions of the Country for number of schools offering IL classes (Patat, 2010; MAECI, 2019). The selection of this specific number of schools is a result of a critical reflection on the research design in relation to the overall time and resources constraints. Informants were to be interviewed multiple times during the study and a wider number of possible participants could have resulted in a problematic management

of time availability, as well as of data collection and analysis. The investigation, indeed, was already affected by the Covid-19 pandemic, by the issues of being conducted under two different universities with different ethical procedures to enable the access to the field, as well as by the differences between schools' and universities' terms of the austral and boreal calendries. An information module together with a consent form (see Appendixes 2 and 3) was sent to educators via their respective Italian language department coordinators.

In conclusion, a total of six schools were interested in the research study and, finally, a total of six teachers from four different schools decided to participate to the research study. As it can be observed in the maps in Figure 25 and 26, the locations of the schools were in Rosario, where two schools participated (Figure 26), Santa Fe and Villa Carlos Paz.

Figure 25

A map of the cities where the schools are located

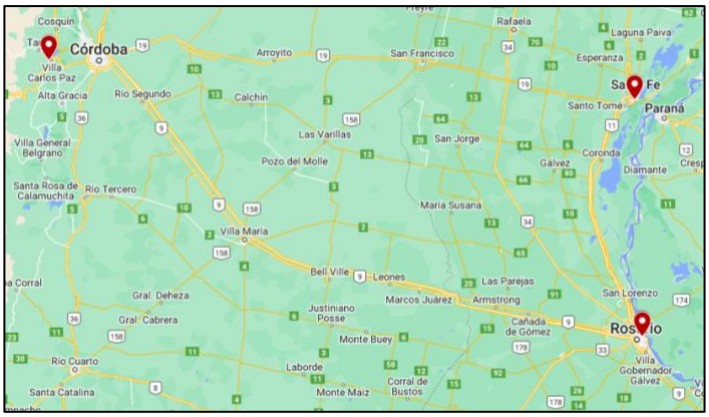
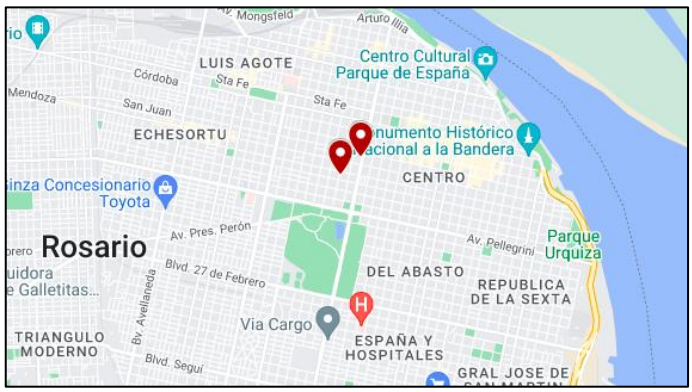


Figure 26

A map of the schools in Rosario, the only City where two schools participated to the study



In the Table 6 below a resume of the number of participants per school is presented. In order to guarantee their privacy, schools and teachers were anonymized. Each teacher was free to decide with how many classes participate to the study and this number is reported for each participant in the table below. Because students were not the focus of the study, data regarding them (such as the number of students for each classroom) were not collected.

Table 6

Schools and number of participants per school

School	n. of teachers	n. of classrooms	Geographical location
School #1 & #2	1	4	Rosario
School #3	2	4	Santa Fe
School #4	3	3	Villa Carlos Paz

An important fact must be underlined here. The actual number of teachers who participated to the first focus group was nine. However, after this first encounter with the researcher, for reasons related to personal time availability, as well as to concerns for

possible infrastructural issues in their institutions, three teachers from three different schools decided to withdraw their participation. This information is particularly relevant for the study, not only because it confirms the issue of time availability for teachers which the researcher personally experienced as an educator in the Country, but it already suggests what factors are able to affect teachers attitudes towards the contextualization of an emerging technology in the specific Argentinian context, as it will be further discussed in the last section of the thesis.

Table 7 below summarizes the characteristics of the teachers who participated to the entire research study. Teachers are indicated with a "T" and are anonymized by numbers. The order of numbers was given to participants according to the order in which they signed and sent the consent forms to the researcher. As previously mentioned, because three of the nine teachers abandoned the study after the first focus group, and because information regarding participants were collected straight after it, numbers were maintained unaltered. Therefore, in the table there will be three teachers (numbers 1, 4 and 5) missing.

Table 7

Characteristics and professional profile of the teachers who participated to the study

Teachers (T)	Gender	Age	Years of Teaching	AR knowledge before the study	Used AR in classroom before the study
T2	Male	47	15 or more	No	No
T3	Female	24	Between 2 - 5	Yes	No
T6	Female	49	Between 11 - 15	No	No
T7	Female	32	Between 2 - 5	No	No
T8	Female	32	Between 2 - 5	No	No
T9	Female	36	Between 2 - 5	No	No

Participants were five women and one man, aged from 24 to 49 years. Four of them had been teaching for two to five years, one between 11 to 15 years and another for more than 15 years. None of the participants had implemented AR in classroom before the study and only one of them, the youngest, knew AR at the time of the study.

The entire research plan received the favorable consent from the Research Ethics Committee of the University of Murcia (Appendix 1). The procedures, regulations and documentation recommended by this committee were used to obtain formal authorization from participants, by means of an informed consent form consisting of an information module for the participant (Appendix 2) and a declaration of informed consent (Appendix 3).

5.6 Instruments and Procedures for Data collection

In describing instruments and procedures implemented for the data collection phase of this study, it is useful to briefly consider the discussion about what is data collection in qualitative research, being this a crucial issue for the current research as well as an hot topic in the field nowadays. Such a premise is considered fundamental in the context of the current paragraph since it allows to understand the core assumptions from which decisions regarding this phase of the research were undertaken. The focus of the discussion on qualitative data collection is built on two main topics, being these what counts as data, and which is the best way to analyze the phenomenon considered. The author of this study adopts Flick (2018)'s perspective, according to which qualitative researchers do not find data *per se*, but they interpret, understand and construct phenomena in a way which allows such phenomena to be used as data. However, this definition of data brings to another point of the discussion which is worth mentioning here, being this the debate on natural and elicited data. According to the 'natural' perspective, researchers should be interested in 'life as it happens as far as possible independent of researcher's constructions, practices, and interventions' (Potter & Shaw, 2018 p. 182). Researchers should only record events and interactions as they occur.

On the other hand, the 'elicited data' perspective sees the researcher implementing methods such as interviews or observations, as in the case of the current study, in order

to elicit data and produce materials to analyze. The critic from supporters of the idea of natural data is that the phenomena explored through elicited data are not the same as it would be without the researcher' activity. Nevertheless, as Flick (2018) underlines, it should be also considered that recordings and registrations as well are part of a researcher' intervention, since is the research which decides what, when and how to record, as well as how to elaborate and analyze the data collected. Therefore, in both perspectives, researchers actually select what to turn into data, how to document the phenomena, as well as how to work with the material collected. Moving from these assumptions, Flick (2018) elaborates a definition of qualitative data collection which is reported above and which was adopted as the theoretical standpoint for this phase of the research.

> 'Qualitative data collection is the selection and production of linguistic (or visual) material for analyzing and understanding phenomena, social fields, subjective and collective experiences and the related meaning-making processes. Meaning-making can refer to subjective or social meanings. Qualitative data collection also is applied to discover and describe issues in the field or structures and processes in routines and practices. Collection can refer to naturally occurring or elicited data. It can be based on talking, listening, observing, analyzing materials as sounds, images or digital phenomena. Data collection can include single or multiple methods. The aim is often to arrive at materials that allow for producing generalizable statements by analyzing and comparing various exemplars, phenomena or cases (Flick, 2018 pp. 14 – 15).

Considering the above definition as the core assumption for the data collection phase of the current research study, this section will describe the techniques and the procedures implemented to collect information during the investigation. They are presented in the chronological order in which they were employed and according to the different steps of the data collection (Phase 2 of the entire research design). Table 8 summarizes the information detailed below. It is important to underline that the terms "information" and "data" are used interchangeably in the current study.

Table 8

Data collection instruments implemented according to the four steps of the data collection phase

Phase 2: Data collection	Instruments and procedures	Participants	Aims
Step 1: pre-design	Focus Group	9 teachers 1 researcher	- Detailed presentation of the research project and scheduling - General presentation of the Metaverse platform - Exploration of teachers first beliefs, attitudes and expectations regarding MAR contextualization for the ILTAL
TEACHERS RECEIVE SURVEY & METAVERSE TUTORIALS			
Step 2: Design	Individual semi-structured interviews	3 teachers 1 researcher	- Exploration of teachers experiences as MAR activities designers - Understanding teachers' needs in relation to MAR design
Step 3: Implementation	Observations in classroom	9 teachers 1 researcher	- Understanding teachers' strategies and teaching practices with MAR
Step 4: Post-Implementation	Individual Semi-structured interviews	4 teachers 1 researcher	- Understanding advantages and disadvantages of MAR from teachers' perspectives

5.6.1 Online Focus Groups

At the beginning of the data collection phase the researcher conducted two different Online Focus Groups with all the participants of the study. It was necessary to create two different groups because of teachers' time availability. Therefore, the procedures and the aims were exactly the same for the two focus groups. Focus groups consists of groups of people whose reactions are studied during guided or open discussions (Silvermann, 2020). Even being aware of the risk of participants' influence on one another, the researcher considered the focus group a useful tool in relation to the aims of the research study. Focus groups enable open discussions among its participants, during which ideas are collected among people who share the same environment but that can offer varied opinions on the same issue and, therefore, generate information rich of different insights (Trigueros et al., 2019).

After ensuring the anonymity of the participants, the researcher presented the main features of the research study with the support of a Power Point presentation (Appendix 8). The objective of this presentation was to further familiarize teachers with the project, even though a detailed information sheet was previously sent together with the consent form. Moreover, a scheduling of the different phases of the project was detailed and the Metaverse platform introduced through a rapid presentation of its basic features. Afterwards, the conversation was opened, questions were asked, and prompts given in order to elicit the sharing of information about teachers' opinions, beliefs, attitudes, expectations, perceived utility, level of anxiety and confidence regarding MAR contextualization for the ILTAL. Appendix 4 shows the guiding questions and the procedures implemented for the data collection in relation to the theoretical constructs from which questions were developed. Because of the Covid-19 pandemic restrictions, as well as for the different distributions of teachers' locations in Argentina, the focus group and the semi-structured interviews were conducted virtually. After the focus group and before the individual interviews, tutorials were sent to participants (See paragraph 2.3) together with a short online survey to collect information on their overall profiles.

5.6.2 Short Online Survey

In order to collect information on participants' professional profiles, a short online survey[13] was sent to them after the OFGs, together with the Metaverse tutorials (the link to the tutorials is reported in the research design section (at the end of paragraph 5.3). The survey contained three questions on gender, age and years of teaching experience of the participants, two questions asking if teachers knew and had used AR in classroom before the study, and two questions regarding their knowledge and use of other emergent technologies in classroom. The questionnaire was built selecting questions from a validated questionnaire which is part of a larger research project of the University of Barcelona and of the University Carlos III of Madrid, aimed to develop innovative teaching tools in line with current teachers' needs[14].

The survey was implemented exclusively to enrich the description of the sample. This information was not implemented to conduct any kind of analysis or to conduce deductions of any kind on the sample itself. Therefore, considering these aspects, the epistemological nature of the study and the purpose for which the questionnaire was implemented, the instrument must not be considered able to affect the nature of the methodology, even if questionnaires are usually implemented in quantitative research.

One last aspect is worth mentioning here. Because the aim of the survey was to describe the sample, answers are reported in Table 7 in the previous paragraph. However, in Table 7 are not reported answers to the questions related to teachers' previous knowledge or use of other emergent technologies. Three teachers, indeed, stated that they did know other emergent technologies, however, when looking at the examples that they gave, they mainly talked about software such as Canva, Kahoot or Padlet. Therefore, none of the participants actually used an emergent technology in classroom before, but this is not reflected in the information collected because of a mis-consideration of the author of this study, which should have provided examples of emergent technologies when posing the question related to their previous use or knowledge of them. The issue should be

[13] https://docs.google.com/forms/d/e/1FAIpQLScu5zEK5Tep2PCuFTSBJXiSf7kYoj5YFfYw4oXmb5OAUbO03Q/viewform?usp=sf_link

[14] https://docs.google.com/forms/d/e/1FAIpQLSd5_3c3oWaBqVyNwZyjwhVpldYY_LC5V-f8xOxXrnomzpFc5Q/viewform?pli=1

carefully considered in future studies, since it led to the decision to not relate to that information in the description of the sample because it could not be considered reliable.

5.6.3 Online Individual Semi-structured Interviews

As tools for data collection, interviews are particularly flexible and allow participants to share interpretations of the environment they live every day, as well as to express their personal and detailed opinion on a specific situation (Flick, 2018). 'In these senses the interview is not simply concerned with collecting data about life: it is part of life itself, its human embeddedness is inescapable' (Cohen et al., 2017, p. 350). As data collection instruments, interviews are therefore able to produce meaningful insights on interviewees' experiences and points of view. Considered these features of interviews, as well as the fact that the aim of the study is to deeply explore teachers' values and purposes in action, they were adopted as data collection instruments for this study.

However, there are some issues related to the implementation of interviews, since they can be time expensive, anonymity cold be difficult to ensure, respondents could feel uncomfortable with the situation and both interviewer and interviewee fatigue could result in bias in the information produced (Flick, 2018). Henceforth, among closed, open and semi-structured interview techniques, the latter were implemented, since considered capable of allowing enough (but not too much) space for answers without resulting time consuming. As previously underlined, as well as focus groups, interviews were conducted virtually.

Moreover, considered the bias which a forced participation to an interview could produce in the data (Yin, 2018), as reported in the information sheet (Appendix 2), teachers were free to decide if being interviewed or not participate. Maybe for this reason and for the level of exposure on their digital abilities, during the phase of design only 3 teachers gave their consent to be interviewed. The guiding questions implemented with the related theoretical constructs from which they were derived are reported in Appendix 6.

5.6.4 Classroom Observations

Probably the main advantage of data collection through observations consists of the fact that the researcher can directly access what is happening in action, without the different settings and times of interviews or focus groups. 'The use of immediate awareness, or direct cognition, as a principal mode of research thus has the potential to yield more valid or authentic data than would otherwise be the case with mediated or inferential methods' (Cohen et al., 2017, p. 396). Differently from other forms of data collection instruments, such as questionnaires or interviews, where people might not freely talk about something or could declare things which are different from what they actually do, during observations the researcher directly access participants' behaviors in action. However, it must also be considered that what is observed depends on a number of factors, such as the context or what is considered as evidence, as well as on the degree of participation of the observer and on the more or less systematic development of the observation (Yin, 2018).

Henceforth, observations could be systematic, when the researcher already knows what he/she is looking for (in a sort of hypothesis testing) and will probably implement a standardized observation scheme. However, the field can be accessed remaining flexible and responsive to what happen, with data collected in order to gain new insights on the phenomenon observed. In this case, the observation will be unsystematic (Flick, 2018). Regarding the context, observations can happen in natural or artificial settings (for example in a classroom or in a laboratory), while regarding the role of the observer they are categorized in two manners. There are participant versus non-participant observations, as well as covert versus overt observations. Regarding the first bionomy, if the researcher is completely immersed in the group studied, becoming an insider for a substantial period of time, he/she is implementing a participant observation. On the contrary, in the case of a non-participant observation, the researcher has less extensive contact with the group and it is known as a non-participant researcher (Cohen et al., 2017). In both cases, the researcher could not explicitly declare his/her role as a researcher in the setting, selecting to implement a covert or overt observation.

Data can be collected through a number of techniques such as recordings, field notes, journals, grids etc. In the case of this study, field notes in the form of unstructured

notes were taken. Video or audio recordings were not realized because they would have required more time to receive the ethical committee approval, which took longer than expected because of the bureaucracy between the two Universities responsible of the researcher study. Moreover, the deriving information on students' perspectives from audio or video recording was not the target of the research study. Therefore, the researcher realized only some pictures in order to describe the strategies which teachers used in the implementation phase. In conclusion, considering all the features of observation as a data collection instrument here discussed in relation to the purposes of the study, covert semi-structured observations where conducted and data collected through field notes.

5.7 Data Analysis

According to (Kennedy et al., 2022), when it comes to qualitative data analysis there are two relations which must be carefully considered. The relation between data collection and data analysis and the relation between theory and data. Regarding the connection between data collection and analysis, Kennedy suggests two different manners in which it can be structured. When a researcher first collects all data and afterwards analyze them, is implementing a *linear-sequential approach* (Kennedy et al., 2022). On the contrary, with an *iterative approach*, the research process is developed through a moving back and forth between data and analysis, with changes and new data gatherings implemented during the research process (Kennedy et al., 2022). Even though the linear-sequential approach is usually applied in quantitative studies, it is quite common in qualitative research as well, as in the case of the present study. However, it must be highlighted that the two approaches which relate data collection to data analysis should be conceived more as the ends of a continuum (Kennedy et al., 2022), with the researcher being closer to one or the other. The matter is more complicated when the other relation, regarding theory and data, is considered.

> When it comes to this complex and even contested relation between theory and data, Kelle (2014) argues that qualitative researchers have to deal with two conflicting challenges: (a) 'the general accepted epistemological tenet that empirical research must always refer to previous insights and already existing

> knowledge'; and (b) that social life and its meanings, actions and structures are constantly changed and reinvented, and therefore, the researchers have to be open to explore the unknown and unpredictable at the same time as being aware that such 'an openness may be hampered by theoretical preconceptions researchers carry with them' (Kennedy et al., 2022, p. 2).

In other words, researchers might implement a deductive approach to data analysis, using theoretical knowledge to interpret and analyze data in order to test hypothesis, for example, or they could use an inductive approach, limiting the role of theory and being open to discover information, patterns or concepts from the data (Creswell & Plano Clark, 2018; Flick, 2018; Silverman, 2020). In the context of this research study, data were not conceived as having to fit in pre-existing theoretical patterns or concepts. Theory is conceived as a framework where the phenomenon under study is collocated and which facilitates the interpretation and understanding of it.

However, the construction of conclusions and knowledge is strongly based on data. The creation of categories and themes during the process of understanding teachers' experiences began with the collaboration with teachers itself, from the consideration of their needs and comments which emerged from the different research techniques implemented. Concepts and outcomes were, henceforth, developed from the close interaction of the researcher with the data and were not pre-supposed a priori (Kennedy, 2022). Therefore, the analysis was conducted through an inductive bottom-up approach to data content (Braun & Clarke, 20222).

However, the implementation of such an approach to data analysis does not mean that the researcher denies the crucial role that prior theoretical knowledge plays in interpreting and understanding the data. On the contrary, as previously underlined, theory is the guiding framework for data interpretation, and the role of the researcher is conceived as tied to her historical and socio-cultural context, as well as to her values, beliefs, assumptions about the world. 'Data can never be free of theoretical influence because observing and collecting data are already 'theory-laden' undertakings. Prior knowledge of a phenomenon inevitably shapes researchers' observations' (Kennedy, 2022, p. 4).

The understanding of the relation between theory and data in terms of induction is at the base of the selection of the specific approach through which data were analyzed. Nevertheless, before presenting the method implemented, it is worth clarifying here that according to the scholars who developed it, coding it is not necessarily either an inductive or a deductive process, since it can have element of both approaches. What is relevant is that the coding orientation fits the purposes of the study and the nature of the research questions (Braun & Clarke, 2022). Reflexive Thematic Analysis (RTA) by Braun & Clarke (2022) was chosen as a method for data analysis mainly because of the crucial role it provides to researcher's subjectivity in the construction of knowledge, since it is considered fundamental in the entire research process.

The author of the study was aware that her role as a researcher would have impacted participants' perceptions of the experience, and vice versa. Therefore, it was important to reflect on how the researcher's and participants' systems of values would have influenced the entire process of data collection, perception and analysis. The RTA by Braun & Clarke (2022) allows plenty of space to researcher's reflection during the entire research process, considering also his/her standpoints in terms of socio-demographic positions in relation to class, race, culture, religion, gender, economic position, age and so on. Reflexivity

> [...] means turning of the researcher lens back onto oneself to recognize and take responsibility for one's own situatedness within the research and the effect that it may have on the setting and people being studied, questions being asked, data being collected and its interpretation. As such, the idea of reflexivity challenges the view of knowledge production as independent of the researcher producing it and of knowledge as objective (Berger, 2015, p. 220).

Even though the author of this study maintained her own reflexivity throughout the entire research process, during the process of data analysis it was considered particularly relevant to take notes and memos on her own reflections, which are reported in the results section in the form of "reflexivity boxes", as observable in paragraph 6.1, for example. Considering the epistemological assumptions of the research study, the methodological framework, the aim and the nature of the research questions, as well as the approach to data collection and analysis, RTA is therefore adopted for the current study since it allows not only to embrace subjectivity, but also to interrogate it by capturing 'both the

researchers' generative role in research, and their insight into, and articulation around, this role' (Braun & Clarke, 2022, p. 13).

A common critique to TA in general, and not specifically to RTA, is that it consists of a very basic and unsophisticated method of analysis which needs the support of other methods to achieve interpretative depth (Crowe et al., 2015). However, as Braun & Clarke (2022) themselves underline, sophistication and depth of analysis actually depend on the manner in which a specific method is used and not on the method itself. In this sense, all analytic approaches could produce poor analysis if used badly. On the contrary, TA and RTA can be implemented to achieve insightful, nuanced analysis, also for its experiential and inductive nature (Flick, 2018), being this characteristics other reasons to choose the method for the current study. Furthermore, Braun & Clarke (2022) developed a detailed and complete practical guide to conduct RTA organized in 6 different phases, which was considered particularly useful for the development of the research study. Data analysis was therefore undertaken following the six phases of familiarization, coding, initial theme generation, development and review of themes, redefinition and nomination of themes and the final writing up. As the authors of the approach underline, these phases are not linear, but they consist of a recursive process that moves back and forward throughout the dataset, until the final structure is reached (Braun & Clarke, 2022).

The first phase of the process is the familiarization, which the researcher approached by manually transcribing the interviews on Word documents and by reading them repeatedly afterwards. During this phase, the researcher identified a number of interesting points for analysis, on which she reflected by taking notes also in the form of sketches. Because Braun & Clarke (2022) invite researchers to include notes, memos and sketches in the writing up phase of their studies, in order to account for researcher's reflexivity, an example of the notes taken during the familiarization phase is reported in Appendix 9. When the coding phase started, the codes and the theme structures were reorganized several times, since the researcher was trying to deeply reflect on the narrative of the data while maintaining a focus on the theory, the aims and the RQs of the study.

Several details related to codes and themes development for each step of the data analysis phase are reported in the reflexivity boxes in the next section of the thesis. During the analysis, after identifying the first themes structures, the researcher reflected on the

descriptive aim of the study and realized that the structures identified were too broad to describe the internal and more subtle aspects of teachers attitudes towards the experience, on the one hand, and of their attribution of purposes and values to the MAR tool, on the other. Henceforth, the author adopted a more deductive approach to data interpretation.

Transcripts were read and analyzed again, going back to the coding phase, listening again to the recordings sometimes and reflecting not only on aims and RQs, but also on the tones of the interviewees, as well as on the questions asked. The semi-final codes and themes structures for each interview and for the initial OFGs were developed. Finally, in the fifth phase of the analysis, themes and sub-themes were refined, defined and named according to the core concepts they clustered, as well as organized in relation to the RQs. Again, because Braun & Clarke (2022) invite researchers to show their reflexivity in the form in which it occurs, some notes and memos for this phase of the analysis are reported in Appendix 9.

The analysis was conducted with the support of the software NVivo 12 for macOS, being this one of the major Qualitative Data Analysis Software (QDAS) available on the market.

> 'NVivo is designed specifically for the analysis of qualitative data, from interviews, to discussion groups and life stories, but it has new features that give it a unique position in the software landscape. In addition to working with texts, it allows us to work with audio, video and image files, and to analyze this audiovisual material in an innovative way. Also, it allows to operate with an almost unlimited number of categories and subcategories being able to compare among themselves in short form by means of matrices of intersection. Also with the NCAPTURE application, screenshots and comments can be added to the program, especially useful for analyzing data from virtual environments' (Palacios, 2013, p. 1007).

A last aspect related to data analysis remain to be discussed, being this the issue of triangulation, in order to clarify how it was conceived and conducted in the current study.

> 'Triangulation means that researchers take different perspectives on an issue under study or – more generally speaking – in answering research questions. These

> perspectives can be substantiated by using several methods and/or in several theoretical approaches. They are, or should be, linked. Furthermore, triangulation refers to combining different sorts of data on the background of the theoretical perspectives, which are applied to the data. As far as possible, these perspectives should be treated and applied on an equal footing and in an equally consequent way. At the same time, triangulation (of different methods or data sorts) should allow a principal surplus of knowledge. For example, triangulation should produce knowledge on different levels, which means insights that go beyond the knowledge made possible by one approach and thus contribute to promoting quality in research' (Flick 2018, p. 23).

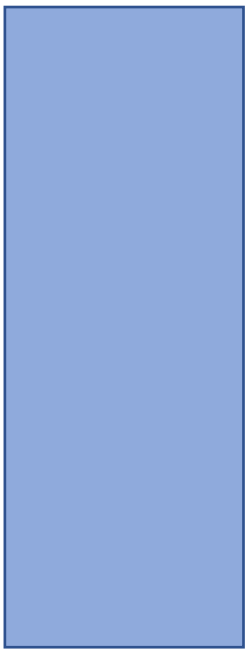
Therefore, triangulation should be conceived as a procedure which extends the collection and the analysis of data in order to develop knowledge on different levels and should not only be considered as a strategy to confirm findings or improving accuracy (Flick, 2018; Braun & Clarke, 2022). According to (Denzin & Lincoln, 2011), four types pf triangulation can be distinguished:

- Data triangulation, when data are collected by different persons, or at different moments, or from different places;
- Investigator triangulation, when more than one researcher are employed as observers or interviewers;
- Theory triangulation, when several theoretical point of view are used to explain the results;
- Methodological triangulation, regarding which (Denzin & Lincoln, 2011) distinguish within-method and between-method triangulation. The first case refers to the implementation of more methods within a same methodology (for example the use of observations and interviews in a qualitative study), while the latter refers to the mixing of methodologies by implementing both qualitative and quantitative instruments.

For the purposes of this research study, the within-methods triangulation has been applied because the data obtained by the implementation of semi-structured interviews and of the focus group with observations allowed the construction of conclusions on different levels.

While interviews and the focus group enabled to focus on subjective knowledge and experience, the use of observations allowed to focus on practices and interactions, enriching the understanding of the teachers' experiences with MAR by adding a new perspective. In this way, 'triangulation become more fruitful – as a strategy for a more comprehensive understanding […]' (Flick, 2018, p. 198). As for the semi-structured interviews, the analysis of the observations was inductive, being this the approach most often implemented (Flick, 2018). Categories were developed from the data collected, considering the researcher's relation with the field as part of the information. For a chronology of data collection and analysis refer to the paragraph 2.3 on research design and specifically to Figure 15 and 16. Transcriptions were realized following the recommendations of (Marvasti, 2004) for the graphic representation of pauses or long sounds. Data extracts were translated into English from Italian, as it will be seen in more details in the next section, following the recommendations of (Resch & Enzenhofer, 2018) on cross-language and multilingual research.

SECTION 3- RESULTS



3 RESULTS

According to (Braun & Clarke, 2022), the 'results and discussion' section in qualitative studies should be merged in a single unit, indicated with the term 'analysis', in order to highlight 'the interpretative work and active subjective role of the researcher' (2022, p. 131). Moreover, the scholars consider the traditional division of 'results' and 'discussion' something strictly related to the traditional positivist scientific model, even though they acknowledge the fact that this model is still firmly implemented in scientific reporting conventions. However, they also recognize that the combination is not always appropriate, since it also depends on journal styles as well as on the type of research report being developed. Furthermore, (Braun & Clarke, 2022) highlight how sometimes, especially in the specific case of Master or PhD thesis, a general discussion section is considered fundamental, since it should contain the researcher overall reflections and discussion across a number of analysis which focused on specific aspects or moments of the research study.

For the reasons here explained, the findings of the current study are organized in two separate sections. In the 'Results' section, findings are presented in the form of themes and codes structures, through an interpretative perspective and with both illustrative and analytic treatment of data extracts (Braun & Clarke, 2022). However, it is in the following 'discussion' unit that the exploration of the theoretical interconnections with the wider scientific context in relation to the specific gaps and the RQs of the study, as well as the contributions to the research community, the future directions and the limitations of the study are considered. Henceforth, data are presented in relation to the different steps of phase 2 of the research design (see Figure 15). For each step a brief overview of the results is offered, while the theme, sub-themes and codes structures are presented in more details straight afterwards.

Considered the importance that (Braun & Clarke, 2022) give to researcher's reflexivity, as largely discussed in the data analysis section (paragraph 5.7), each step contains a short section on researcher's reflections as well. The scholars invite researchers to include reflections in the different forms in which they occurred, for example including notes, sketches or drawings. Because of the plurilingual background of the researcher,

many times researcher's reflections were hand notes in a mix of Italian, Spanish and English. For ease of reading, researcher's reflections were translated into English and are included in short boxes straight after the overview sections. Furthermore, (Braun & Clarke, 2022) invite the researcher to report their reflections in the first person singular, because it better accounts for the interpretative role of researchers in qualitative studies and, therefore, for the fact that the researcher is considered as part of knowledge construction in pure qualitative research. The author of this study embraces this perspective and for this reason adopted the recommendation of the scholars of using the first person singular in reporting her own reflections, as it will be observed in the 'reflexivity boxes'.

Another consideration is worth mentioning in this context. When reporting RTA, (Braun & Clarke, 2022) do not encourage a focus on frequency, especially in the form of numbers, since it is not considered consistent with the assumptions of a pure qualitative framework. On the contrary, the scholars invite to embrace partiality, refusing the idea of 'a final, absolute analysis' (2022, p. 142) and suggest to follow the solution adopted by their colleague Gareth Terry (Terry, 2010) in his doctoral thesis, which is reported below:

> When a theme is discussed within this chapter, some quantifying language will be used to discuss its prevalence across the data corpus. It is important to note that this terms are not in any way attempting to 'count' the instances of a theme's occurrence (as per content analysis), but rather to provide some indication of the strength or consistency of a theme. Where the term 'many' is used, it refers to occurrences of the theme within at least 10 of the 17 'typical' participants accounts. When I use 'most' or 'almost all', this will mean at least 12 to 14 occurrences are being referred to, and 'some' as six to eight. Terms such as 'commonly' and 'typically' or 'often' will more broadly refer to occurrences of the theme in anywhere between 10 and 17 interviews and 'occasionally' or 'uncommon' will refer to less than half of the participants (2010, p. 108).

Without following the strict division adopted by the scholar, the author of this study adjusted its solution to the number of participants of her own research (six in total), reporting references information in the form of 'all the teachers', 'many', 'some', 'few' or 'only one teacher', as a way to embrace the idea of partiality. However, sometimes

codebooks for the themes and codes structured are also reported. Nevertheless, it must be underlined the fact that even though codebooks report the number of references for a specific code or theme, they are here presented not with the intention to quantify or to count the occurrences of a code or a theme, but rather to show the prevalence of codes in relation to the each other, as Terry (2010) indicates.

One last clarification in worth doing regarding the language of the interviews. As specified in chapter two, interviews were conducted and transcribed in Italian. However, in order to not hinder the fluidity of reading, interview extracts are here translated into English and reported in Italian in the form of footnotes. Grammatical, syntactic and vocabulary errors are maintained in the originals. In the English translations they are maintained as close as possible to the originals, unless in those cases where the literal translation would have resulted in an obstacle to access the overall meaning of the extract.

6.1 Step 1: Pre-Design

6.1.1 Overview and reflexivity

As presented in the 'Context and participants' section of this thesis (see chapter 5.5), there were nine participants during the Online Focus Groups, eight women and one man. Only one of them, the youngest teacher of 24 years old, knew AR before the study and no one of them implemented it in classroom before. Because of teachers' availability, two OFGs were organized. In the first FG there were six teachers (five women and one man) from four different institutions and in the second FG there were three women teachers from the same institution. During the first part of the two FGs, an overall presentation of the project and of the MAR platform to be implemented was conducted through a Power Point presentation (Appendix 8). Therefore, even if the OFG were completely transcribed, the researcher started to analytically consider their contents after each presentation, which means that OFG were respectively analysed from minute 18 approximately for the first FG, and from minute 19 for the second FG. Even though the OFGs were conducted in two separate moments, findings were considered and interpreted as a whole.

Overall, participants resulted to be enthusiastic about the project and about the idea of contextualizing MAR for the ILTAL. They showed curiosity and excitement,

especially when playing with, and therefore discovering, the Metaverse App. Teachers discussed some possible advantages of MAR use, considering motivation among the main benefits of using the teaching and learning resource. According to their perspectives, MAR implementation could develop a more engaging environment for students, also helping them to conceive, and therefore use, smartphones as learning resources. However, several teachers underlined the fact that there could be downsides of smartphones implementation as well, since students could be distracted by social media, messaging or other uses of their mobile devices different from the MAR activities.

Nevertheless, teachers highlighted how, by managing students' time when playing with the App and by having them work collaboratively, not only the risk of possible distractions could be contained, but also other advantages could result from such implementation, such as the ones related to group or peer work. In discussing these aspects, teachers raised a debate on the Covid-19 pandemic and on its positive consequences on the teaching-and-learning environment management. Participants recognized in the pandemic a moment which not only accelerated teachers' digital skills development, but also imposed the necessity of implementing mobile phones as a teaching and learning resource in classroom. Therefore, together with motivation, other advantages of using MAR in classroom were identified and discussed by the participants, being these the promotion of a better student-smartphone relation, the enhancement of group work and the development of a better teacher-student relationship.

Teachers expressed some concerns as well, mainly related to infrastructures, especially schools' Wi-Fi, but also regarding the functioning of the App itself or the availability of students' personal mobile internet connection. Other teachers' anxieties regarded time availability and the possible difficulties in learning how to work with the MAR platform, as well as possible students' distractions while using it in classroom.

The researcher will now report her own reflections regarding the OFGs analysis process in the reflexivity box below and will then present the two main themes developed in relation to the themes, sub-themes and codes structure.

Researcher's reflexivity box

While conducting the OFGs, I was reflecting on the fact that my experience as a former IL teacher in Argentina could have influenced the process. Having lived and worked in the Country for almost six years, I was aware of the fact that teachers work in a number of institutions to achieve an average salary. Therefore, I was scared that this circumstance could have impacted teachers' willingness and enthusiasm to participate in the study. Even though I tried to maintain consciousness on this issue, during the familiarisation and coding phases I realized that sometimes during the OFGs I felt so close to participants, especially when they discussed concerns about time availability, that I was almost encouraging them (for example with sentences like "do not worry, you have two months!"). I do not want to say that this is something negative in the context of a study where the researcher works closely to the participants, but I thought it was worth mentioning it when reflecting on my role as a researcher during both data collection and analysis.

Regarding the process of analysis itself, during phases two and three of the analysis (doing coding and generating initial themes), I was at the level of teachers' perceived advantages and disadvantages of MAR implementation. However, when reviewing and refining themes (phase four and five) I realised that there was something more in the data. Something which allowed me to get closer to initial 4teachers' values, beliefs and purposes during the process of approaching the MAR tool. Therefore, focusing more on the consideration of their general attitudes regarding the process, I was able to see the wider picture and to achieve the description that will be detailed afterwards.

Another interesting reflection came after the first Focus Group. When teachers tried the demonstration game with the App, I asked them to close their microphones, in order to not disturb each other. However, after the first OFG I realized I had lost lot of information, which I was able to collect for the second OFG, when I did not tell the participants to close their microphones. Therefore, I was able to collect much more information regarding their enthusiasm during the experience, as it will be seen in the extracts reported.

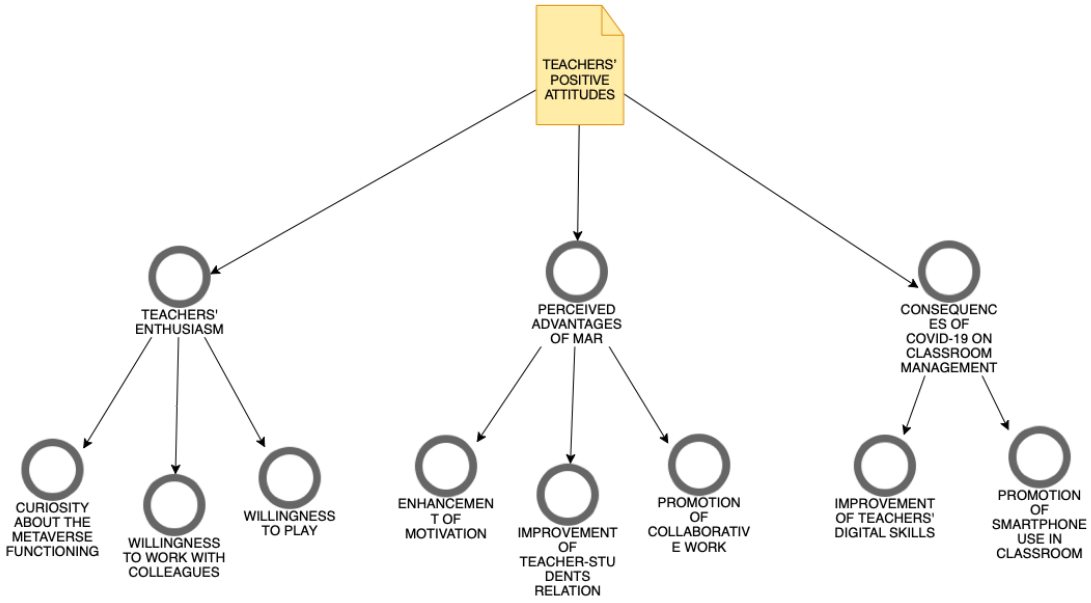
6.1.2 Theme 1: Teachers' positive attitudes

From the presentation of the Metaverse studio design platform to the experience of playing with an AR activity with their personal smartphones, teachers showed enthusiasm and curiosity towards the idea of entangling MAR in their teaching practice. Certainly,

the novelty of the tool is a factor to be considered in trying to explain such curiosity. However, it must be underlined that the positive attitude of the participants resulted to be connected to two other crucial factors, which consists of the main sub-themes developed during the analysis. On the one hand, there are the possible advantages of MAR entanglement for the ILTAL, which teachers started to discuss straight after playing with the Metaverse App. On the other, the positive consequences of the Covid-19 pandemic on the overall classroom management were also discussed by the teachers. Each of these aspects is resumed in the sub-themes and codes structure of Theme 1, presented below in Figure 27 and carefully detailed afterwards.

Figure 27

Theme, sub-themes and code structure for the theme 'Teachers' Positive Attitudes'



During the general presentation of the Metaverse Studio, many teachers started to ask a number of questions regarding specific functionalities of the MAR platform, even though the Power Point presentation had been conceived by the researcher as an overall introduction to the Studio design platform, since tutorials were going to be sent to teachers after the OFGs. T3 for example asked: "Is it possible that when you play and you answer

correctly you get access to the next level, for example[15]?". T8 wanted to know if "is it possible to add more characters, for example?[16]" and T7 was already trying to develop an activity while the researcher was presenting the main features of the Metaverse design studio, as showed in the following extract where the participants communicate to the researcher that she had registered to the platform to develop an activity:

(T7): "May I ask you a question?

INTERVIEWER (I): Yes, of course!

(T7): I have just…have just registered [*laughs*]. I am here already…oh, sorry, here, 'create experience'

(I): [laughs] Yes, at the top right?

(T7): Yes, sorry, I couldn't see it on the screen![17]"

All teachers' comments and questions showing their interest in the specific features of the Metaverse where coded under "Curiosity about the Metaverse functioning". Right after the presentation, teachers continued to show positive attitudes towards the experience while playing with a demo MAR activity. The activity was about Dante Alighieri, the author of the Divine Comedy, and players had to watch a video on the life of the Italian poet and answer to some questions afterwards. Teachers started to interact with each other while playing, laughing, asking questions and doing comments like: (T7) "Does it come to you to do like this? [*she moves the smartphone as she was looking for something in the space around her*] I mean, with… with your phones to be able to…? [*they laugh*]". Moreover, they interacted with conversations like:

[15] È possible che quando tu ci stai giocando è come che:: sblocchi dei livelli tipo, se rispondi bene, sblocchi il secondo?

[16] E si possono aggiungere altri personaggi. Per esempio?

[17] INSEGNANTE (IN)7: ti posso fare una domanda? INTERVISTATORE (I): Sì certo! IN7: Ho appena::: Mi sono appena registrata. Sì, sono già qua. Ah, qua scusa. Create experience. I: In alto a destra. IN7: Sì, in alto a destra. Sì, scusami non vedevo dove arrivava lo schermo.

(T9): “Ooohhhh!!! There is music when- [*she is interrupted*]

(T7): “When you win! [*they laugh*] That’s interesting! You win coins!”

(T9): “Yeah! Exactly!”

(I): “Yes, when you answer correctly you win a coin[18].”

When teachers gave a wrong answer, they were sent to the hell of the Divine Comedy, with Lucifer, instead of advancing in the game. Of course, they had the chance to try again. Therefore, participants made comments such as:

(T8): “Noooo! I am back to hell!”

(I): “Where are you stuck?”

(T8): “No no, I tried again [*the question*] who is he married with and I tried again, so…it is very good![19]”

The data related to these type of interactions are coded as ‘Willingness to play’.

The last code identified in relation to the sub-theme ‘teachers’ enthusiasm’ is called ‘Willingness to work with colleagues’ and it clusters all those cases in which participants showed interest by expressing their eagerness to work with one or more colleagues, as in the following extracts: “Yes, another question, is it possible::: is it possible to do:: because we work together, ehm, I mean, we have the same, the same courses, so we were already thinking about, ehm…what could be the contents, ehm, I mean on what kind of contents develop an activity, so yes, is it possible to work in peers?[20]” (T6).

[18] I9: Ah!! Fa la musica come- I7: Come vinci! Quello è interessante. Vinci delle monete! I9: Eh, esatto!

[19] IN8: Noooo! Sono di nuovo nell’inferno! I: dove ti sei bloccata? IN8: No, no, ho provato un'altra volta con con chi è sposato e ho riprovato un'altra volta, quindi…è molto buono!

[20] IN6: Sì, un'altra domanda, si può::: c'è la possibilità di svolgere appunto, siccome noi lavoriamo insieme no, nel senso che abbiamo gli stessi, ecco, gli stessi anni stavamo pensando già, no? quali potrebbero essere, uhm il cioè i contenuti, gli argomenti su cui svolgere questa attività, c'è la possibilità appunto di farlo in coppia?

(T2): "Ok, so… I like the idea, especially because I will be able to work with [*says the name of T6*], my colleague and friend and we can do lot of things together, not only from the design point of view, but also afterwards, when you bring this to the classroom… and working together is beautiful, right? Because you can share experiences, feelings. It is a matter of balance, indeed. If one day she can't work on it, maybe I can, and so on[21]".

The other sub-theme developed in order to describe teachers' positive attitudes towards MAR during the initial OFGs relates to participants' 'Perceived advantages of MAR'. Motivation and the improvement of teacher-students relation seems to be the two main possible benefits of MAR according to teachers' perceptions. From their perspectives, MAR is expected to enable the implementation of activities in an innovative manner in classroom, developing a more engaging environment for students. T3, for example, said: "I think that this could be very positive for motivation, because students spend all their time with their smartphones and they are looking all the time for this different types of inputs…they get tired of books, so, in this sense, it looks very positive to me. It's different from everything they are used to in terms of learning[22]". T4 followed this comment by saying: "I share the idea with her that it will be motivating for students and…and they spend all their time sticking to their phones! So a proposal of this type I believe…well I think it is up-to-date, nice, interesting and also positive![23]". While T7 added: "No, I truly believe that everything will work perfectly because, as I said, they really love to use smartphones and this activities that are not always the same thing…well, it will be… it will be a good experience[24]".

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[21] Eh beh, niente… a me l'idea piace soprattutto perché potrò lavorare insieme a [dice nome prof.] collega amica e possiamo fare tante cose insieme, non solo dal punto di vista della progettazione, ma anche poi trasportare, diciamo, mandare questo in aula:: e lavorare insieme bello anche no? Condividere esperienze, sensazioni. Infatti è questione dell'equilibrio. Se un giorno lei non può, io do una mano e e così via.

[22] IN.3: Secondo me sulla motivazione potrebbe essere una cosa molto positiva, nel senso che i ragazzi stanno tutto il tempo sui telefonini e cercano tutto il tempo questi stimoli diversi:: un po' si stancano dei libri, quindi in questo senso mi sembra una cosa molto positiva. È diversa da quello a cui sono abituati in quanto ad apprendimento.

[23] IN4: Condivido anche con lei che immagino che per gli studenti sarà motivante e::: e sono tutto il tempo attaccati al telefonino! Quindi proporre un'attività di questo tipo mi sembra eh::: non so aggiornata, bella, interessante e anche positiva.

[24] IN.7: No, io credo veramente che tutto andrà benissimo perché, come ti dico, a loro piace tanto utilizzare il cellulare e queste attività che non sono sempre le stesse…Eh, sarà:: sarà una bella esperienza.

Together with motivation, the implementation of AR through smartphones is perceived to be advantageous for its possibility to improve teacher-students relations, as well as to promote collaborative work. Even though this last aspect was considered only by few teachers, participants underlined how, by implementing MAR in groups, the technology could help student-student relation, encouraging collaboration with peers and group work. As previously discussed in the introduction of this section of the thesis, even though (Braun & Clarke, 2022) suggest not to focus on themes and codes frequency, the codebook for Theme 1 is reported below in Table 9, in order to give a wider picture of the data gathered (the number of the file in the second column refers to the first or the second OFG).

Table 9

Codebook for the theme 'Teachers' Positive Attitudes'

Themes, Sub-themes and Codes	Files	References
Theme1: TEACHERS' POSITIVE ATTITUDES	2	43
TEACHERS' ENTHUSIASM	2	22
Curiosity about the Metaverse functioning	2	9
Willingness to play	1	9
Willingness to work with colleagues	1	4
PERCEIVED ADVANTAGES OF MAR	2	15
notivation	2	5
rovement of teacher-students relation	2	7
f collaborative work	2	3

CONSEQUENCES OF COVID-19 ON CLASSROOM MANAGEMENT	2	6
Improvement of teachers' digital skills	2	5
Promotion of smartphone use in classroom	1	1

As it can be observed, regarding the code 'Improvement of teacher-students relation' several teachers expressed the idea that working with this type of technology could make them feel closer to students' realities, as resumed by the statement of T7, who said that "For example, as a teacher, I keep learning new things that are related to the world of virtuality, of the Internet, of technologies etc., well, it is very important! Because students, students are already there, in a new world. It's another generation, it is not like ours. And we are not…we are not that old [laughs], but it is not the same![25]". T8 added:

"Well, no, I agree with, with the girls. That yes, that it is also important for us to be more updated. And also to be able to, let's say, to be confident when we're in front of the students. It's like a way of saying, 'Well! I know what I'm doing, so I can help you!' I am also available to do things, so that maybe::: well, even if they have the proposal to do something, well, that we can see it together, that in this way I do not feel insecure at the moment to use a technology and I am not afraid, let's say, to do anything[26]". T6 as well commented this aspect by saying: "Sorry! No, I just want to finish::: that from the point

[25] IN7: Per esempio, io lo continuo a fare, ma come insegnante sempre imparare cose nuove, che abbiano a che vedere soprattutto con questo mondo della virtualità, dell'internet, delle tecnologie, eccetera eccetera, eh, è importantissimo! Perché gli alunni, gli studenti sono già lì, sono in un mondo nuovo. È un'altra generazione, non è come la nostra! E non è che noi siamo…abbiamo così tanti anni [ride], ma non è lo stesso!

[26] IN.8: Bene, no, io sono d'accordo con, con le ragazze. Che sì, che per noi è anche importante essere più attualizzate. E anche per poter, diciamo, essere sicure al momento di essere di fronte ai ragazzi. Mi sembra come un modo di dire 'Bene! Io so quello che faccio, quindi vi posso aiutare!' Sono disponibile anche a fare delle cose, quindi, che magari::: cioè, anche se loro hanno la proposta di farlo, eh bene, che lo possiamo vedere insieme, che io così non mi sento insicura al momento di usare le tecnologie e non ho paura, diciamo, di fare qualsiasi cosa.

of view, I mean, uhm... it goes beyond learning... it is also a way to encounter the students. I mean, another way to:: to share with them their reality![27]".

The issue of teachers' digital knowledge and skills is related to the last sub-theme developed in order to explain teachers' positive attitudes towards the experience of implementing MAR. Teachers expressed a feeling of confidence with the idea of learning how to design AR activities, which seemed to be related to the fact that they already experienced a sort of fast improvement of their digital skills during the Covid-19 Pandemic. Consequently, they lived new ways of classroom management which made them feel more confident at the moment of learning something more complicated such as AR design. In this regard, T5 explained how "Certainly we have been able to learn many things, so this [*referring to the Covid-19 pandemic*]…this was actually a very positive experience and therefore this one [*the MAR design*] seems to me another positive experience, well, actually it is a challenge, but, you know, after THAT period, maybe other things…this... this experience, this App or others, they do not scare me, I mean, it's learning new things![28]".

The other aspect related to the consequences of the Covid-19 that teachers discussed relates to the necessity to implement smartphones as a regular teaching and learning resource especially after the Covid-19 pandemic. In the codebook in Table 9, this code has only one reference, because it overlapped with the references regarding teacher-students relation, as well as the ones related to the 'Enhancement of Motivation' code. However, it can be resumed in the statement of T3, which commented "Well, I think that we all see a lot this fact that today they have their mobile phones in their hands all the time. Now it's part of them. I think that even during the Pandemic, uhm, it was a fundamental part of their learning. In fact, when we got back to school, they had everything on their phones. In fact, when you asked to take the book, they told you well, but I have it on my phone! Uhm, so today it's not a resource or as an extra resource, but

[27] IN6: Scusa! No, tanto per finire:::: che dal punto di vista, Cioè, uhm…. va al di là dell'apprendimento… è anche un modo per incontrarci con i ragazzi. Cioè, un altro modo per:: Per condividere con loro la loro realtà!

[28] IN5: E sicuramente siamo riusciti ad imparare tante cose, quindi è stata un… un'esperienza molto positiva e quindi questo mi sembra anche un'altra, cioè infatti è una sfida però no, sai, dopo QUEL periodo mi sa che le altre cose::: che questa:: questa esperienza, questa app o altre tante, non è che mi mettono paura, cioè imparare cose nuove.

it is pretty much like a book, I mean, I don't know how to explain it, but it's not an extra resource like we thought before, which we used just to maybe look for a word? No, it has become a tool that must always be inside the lesson[29]."

6.1.3 Theme 2: Teachers' concerns

Although teachers' overall positive attitudes, participants showed some concerns regarding the idea of experiencing the contextualization of MAR for their teaching practice. Looking at the world cloud below in Figure 28, is it possible to observe that close to the main words, which are 'students, activity, group, cell-phone', there are also words such as 'difficult (to the right of *cellulare*), connection (down, under *insegnanti*) and time' (down, between *gruppo* and *insegnanti*). The frequency of these words is lower than the other positive words, but they help to understand which are the main aspects that worried teachers. These aspects regard two main categories, which are indicated with the sub-themes 'Infrastructural issues' and 'Possible obstacles to implementation'.

Regarding the first sub-theme, teachers' main concerns relate to the availability of Wi-Fi at school, which is a main issue, as it is confirmed by the words of T4: "Which are the requirements, let's say? I mean, electronic requirements, to do this…this project, because it is important to clarify that in our schools…uhm…let's say, the Wi-Fi is an issue. Because…because our school has a connection that really…even for…let's say, even for everyday activities sometimes it is not enough…If the school has to provide the RIGHT Wi-Fi to do this project, I can already tell you [*says the name of the researcher*] that we will have a:: a problem since the beginning, I know it already[30]". This same

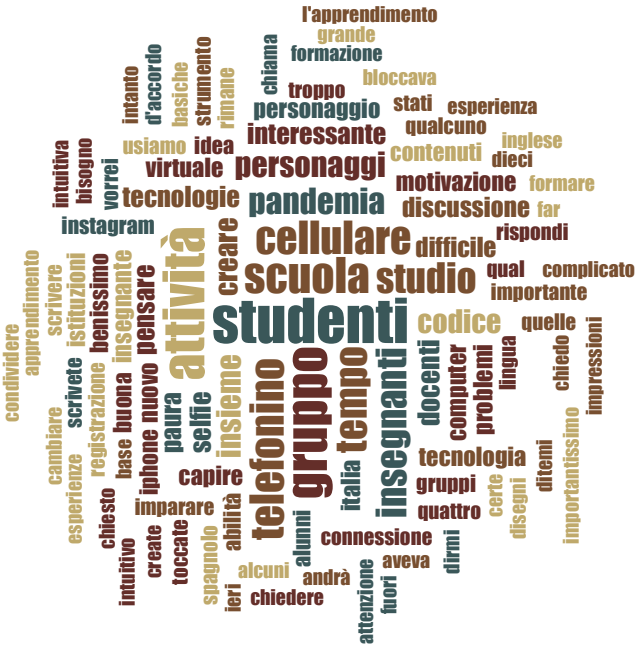
[29] IN3: Eh penso che si veda molto questo fatto che oggi abbiano il cellulare tutto il tempo in mano. Ormai fa parte di loro. Penso che anche durante la pandemia, um, sia stata una parte fondamentale del loro apprendimento. Infatti, quando siamo tornati a scuola, um loro avevano tutto dentro il telefono. Infatti, quando tu dicevi bene, prendete il libro. Loro ti dicevano bene, ma io ce l'ho sul telefono. Um, quindi oggi non è una risorsa e cioè è una risorsa extra, ma praticamente come il libro, Cioè, non è che non so come spiegarlo, ma non è un materiale in più come si pensava prima, cioè che lo utilizziamo soltanto per magari cercare una parola? No, ormai è diventato una cosa in più che deve essere sempre dentro la lezione.

[30] IN:4 Quali sarebbero le condizioni, diciamo? Voglio dire informatiche, per poter portare avanti questo::: questo, questo lavoro o per…perché vale la pena di chiarire che nelle nostre scuole uhm, diciamo, il tema wi-fi è un problema. Perché…perché la nostra scuola ha una rete che veramente anche per…diciamo per le

teacher abandoned the study after the OFGs, because she did not want to assume the risk to work in a project and not being able to implement it afterwards because of issues related to the Wi-Fi connection in her institution.

Figure 28

Word cloud of the theme 'Teachers' concerns'



Other teachers as well expressed concerns regarding the functioning of the Wi-Fi connection at their institutions, considering the possibility to have students' work in groups with their personal internet connection as a solution. However, this suggestion was rejected by one teacher, which underlined the fact that even though students use personal data all the time, when they are asked to use them for teaching-and-learning

attività quotidiane a volte non basta…Se la scuola è quella che deve provvedere del wi-fi corretto per poter portare avanti questo lavoro, io già ti posso anticipare Martina, che veramente ci sarà un problema là dall'inizio, già lo so.

purposes they usually refuse to do it. Finally, after continuing the discussion on this aspect, all the teachers agreed on considering group work as a solution.

Collaborative work was proposed as a possible resolution not only to potential infrastructural problems, but also to the other factor which seemed to cause anxiety to the participants, being this the compatibility of the Metaverse App itself with students' smartphones. As described in the methodology section (see 5.4), indeed, the Metaverse App worked on Android devices and caused many problems with iOS systems. T3 highlighted, for example: "What worries me is that the App will work. Because at least in the case of [*says the name of her institution*], most of them [*referring to the students*] have iPhones. Do you think they might have another way to use the App?[31]". Even if just two teachers expressed this concern, it was maintained in the code structure as 'App related issues' (see Table 10 and Figure 29 below) because of the importance that it has for the entire experience, as well as for the overall research project in relation to its aims and the RQs.

The other concerns which teachers expressed regarding MAR implementation are clustered under the sub-theme 'Possible obstacles to implementation'. Again, a main concern is connected to smartphones use, and it relates to the fact that students could be distracted by spending time on social media, or listening to music, or messaging with friends instead of working with the Metaverse activities. As it can be observed in Table 10, many teachers showed concerns for this issue, with comments like "That's right [*she laughs*]. But there are some groups that maybe use cell phones very well and these things will be very easy for them. But you can't ask them to use their smartphones. Why? Because you can't ask! because maybe they are using the App and after thirty seconds you realize that they are doing something else, completely different from::: the verbs![32]"

[31] A me la cosa che preoccupa è che l'App funzioni. Perché almeno nel caso della [dice il nome della sua scuola], la maggioranza di loro hanno iPhone. Credi che magari possano avere un altro mezzo per utilizzare l'App?

[32] IN7: Esatto [ride]. Ma ci sono alcuni gruppi che forse utilizzano il cellulare benissimo e queste cose saranno facilissime per loro. Ma non si può chiedere di utilizzare il cellulare. Perché? Perché direttamente non si può chiedere! Perché forse stanno utilizzando la App e dopo trenta secondi ti rendi conto che stanno vedendo un'altra cosa completamente diversa da::: i verbi!

(T7), or "Well they prefer…then they go on whatsapp to talk, or they listen to music. So one should be there to check also the good use eh![33]" (T5).

Table 10

Codebook for the theme 'Teachers' concerns'

Themes, Sub-themes and codes	Files	References
Theme 2: TEACHERS' CONCERNS	2	23
INFRUSTRUCTURAL ISSUES	2	7
Wi-fi availability	2	4
Use of students' personal it connection	1	1
App related issues	2	2
POSSIBLE OBSTACLES TO IMPLEMENTATION	2	16
Concerns about students' distraction	2	6
Concerns about the difficulty to learn	1	2
Lack of ongoing teacher training	1	5
Time availability	1	3

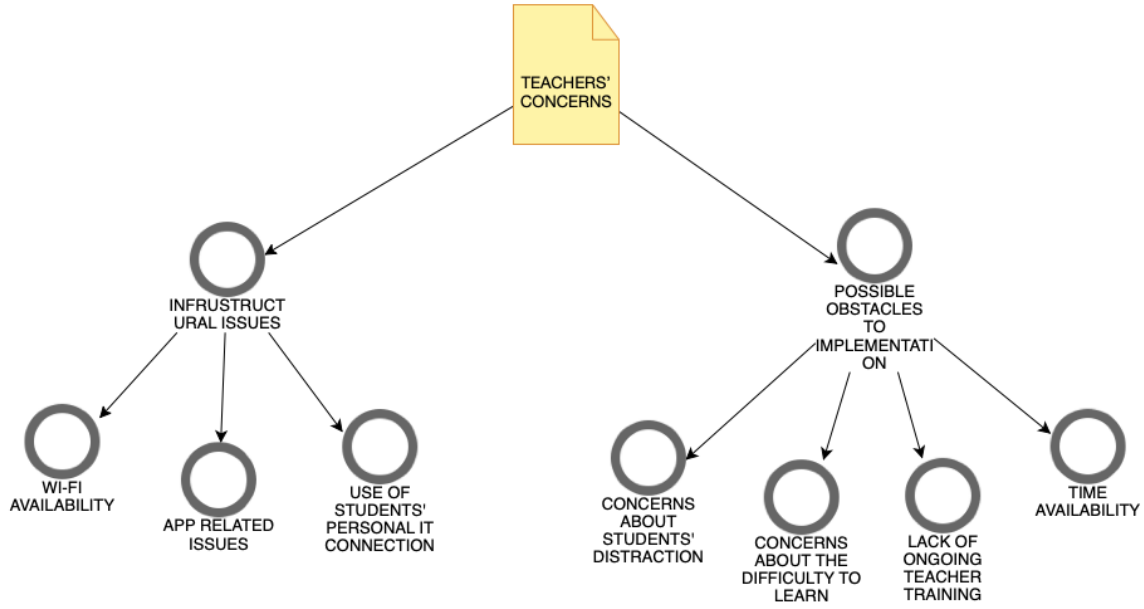
Together with concerns regarding possible students' distraction while using the Metavarse App, some other important issues where considered by the participants, mainly related to the anxieties generated to participants by the process of learning how to design MAR activities, even though they previously underlined that they felt more confident with technologies after the Covid-19 pandemic. These aspects were clustered under the codes 'Concerns about the difficulty to learn', 'Lack of teacher training' and, as

[33] IN5: Eh, che preferiscono::: che poi se ne vanno o su whatsapp a parlare, o a sentire la musica. Quindi uno dovrebbe essere lì a controllare anche il buon uso eh!

previously underlined in the reflexivity section, the crucial issue of ‘Time availability’, as it can be observed in the sub-themes and codes structure in Figure 29.

Figure 29

Theme, sub-themes and codes structure for the theme ‘Teachers’ concerns’



T3 for example, said “It also seems to me an excellent strategy to evaluate in a different way, however it is a bit challenging for us. Because I imagine that developing everything is not easy at all, so maybe it will take a little more time than maybe:: a normal test, these kind of activities here I mean. But I think that it is an excellent resource to::: to put into practice, to learn to use[34].”

[34] Mi sembra anche un un'ottima strategia anche per valutare in un modo diverso, anche se magari un po' impegnativo dalla nostra parte. Perché immagino che prepararlo tutto quanto non sia per niente semplice, quindi, e magari uno ci mette un po' più di tempo che magari:: un test normale, queste cose qui. Ma penso che sia un'ottima risorsa da::: da mettere in pratica, da imparare ad utilizzare.

More extracts are reported below in order to show how the issue of time availability consists of a main cause of anxiety for teachers. T7 commented: "Personally, PERSONALLY [*repeats*], with technology SO FAR I have no problem, quite the opposite. Then I think that using it [*the Metaverse*] or creating things or the fact that I can come up with some ideas will not be a problem, but MAYBE, to organize something that is beautiful, interesting and practical and that…at least for the first time, because it will be precisely our first time…well, perhaps a, a project, a little shorter, simple, to see if the App works well:: if for us it is a simple thing to do::: that, well, that…because as you say, there are also one hundred and fifty things we have to do at school! Because they ask us this, because then there are the tests, because the, the government of the city asks us to do something and something else…and we have to compile this and compile the other…it's not for you eh, for goodness sake! And it is not that, that we… it is not that we don't have time, we have it...We are in September, at the end of September, we still need those months to finish the year...BUT:::!!![35]". Adding to this comment, T9 said: "I thought the same thing, as [*says the name of the colleague*] thinks. Because I study in the evening, until eleven o' clock, from nine PM. So sometimes the time is a little... I don't have that much time, though:: well, this for me:: I like it, I would like to do it![36]".

Regarding the last code identified which relates to the lack of support or teacher training, teachers explained how the possibilities to attend courses on the implementation of technology in the classroom depends on their own willingness more than on top-down proposals. T5 explained that "The last proposal from the Ministery of Education was in

[35] IN7: Sì, sì. Io personalmente, PERSONALMENTE [ripete] con la tecnologia FINORA non ho nessun problema, tutto il contrario. Allora credo che utilizzarla [il Metaverse] o creare delle cose o che mi vengano delle idee o ci vengano delle idee non sarà un problema, ma forse organizzare qualcosa che sia bello, interessante e pratico…e che almeno per la prima volta::: che sarà appunto la nostra prima volta, sia:: forse un, un progetto, un po' più breve, più semplice per vedere se la App funziona bene:: se per noi è una cosa semplice da fare::: che, e che bene, perché come dici, anche ci sono centocinquanta cose che dobbiamo fare a scuola:: perché ci chiedono questo, perché dopo ci sono le prove, perché la, la città ci chiede l'altro e l'altro…e che dobbiamo compilare e compilare:: non è per te eh, per carità! E non che, che non… cioè non è che non abbiamo tempo, ce l'abbiamo…Siamo a settembre, fine settembre, ci mancano quei mesi ancora per finire l'anno…MA::::!!!

[36] IN9: Io pensavo così, come la pensa [dice il nome della collega]. Perché io studio di sera, fino alle undici, dalle nove di sera. Quindi a volte il tempo è un po'...Non ho tanto tempo così, però:: bene, questo per me:: mi piace, lo vorrei fare!

2015, 2016. Then they did not suggested anything else[37]" and commented how, sometimes, IL teachers from different institutions in Argentina search for training courses on educational technologies, suggesting them to colleagues and trying to make a sort of teacher network in order to participate to such courses and be updated: "We work, let's say, in a cooperative manner. For example with [*says the name of the other institution participating to the study*] in Rosario we do some courses. Or they let us know about or their courses…[38]".

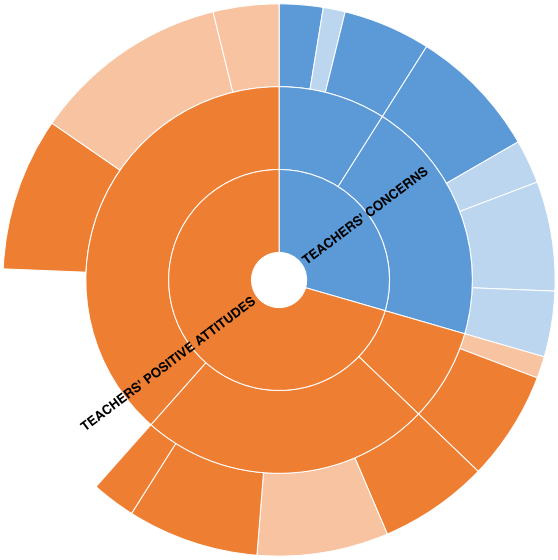
In conclusion, during the two OFGs, overall teachers showed positive attitudes towards the experience of contextualizing MAR for the ILTAL. They expressed curiosity towards the App functioning, they enjoyed to play with it and they showed willingness to work in the project with their colleagues, asking if it was possible to develop activities together. Moreover, by knowing the MAR tool to be implemented they started to perceive some expected advantages of it, such as a possible improvement of students' motivation, an enhancement of student-teachers relations, as well as a promotion of collaborative work. Furthermore, teachers resulted to be not so scared about the idea of learning how to design AR activities, because they considered the Covid-19 Pandemic a moment that, by forcing them to implement a plethora of digital tools, helped teachers to improve their digital knowledge and skills. However, participants also expressed some concerns regarding the experience of entangling the Metaverse in their teaching practice, especially related to infrastructural issues, on the one hand, as well as to personal anxieties due to time availability or to the lack of top-down initiatives to support teacher training on the use of technologies in classroom. Nevertheless, overall the references for teachers' positive attitudes were more than the references for teachers' concerns, as observable in the final Figure 30, which suggests a constructive and optimistic predisposition of teachers towards the experience in general and towards the next step of the research, being this the design of the MAR activities, which is presented in the next paragraph.

[37] IN5: Del ministero l'ultimo è stato nel duemila e quindici, sedici. È finito tutto poi dal ministero. Non abbiamo ricevuto più niente dal nostro.

[38] Noi lavoriamo abbastanza, uhm, diciamo, in modo cooperativo. Per esempio con la Dante di Rosario e noi facciamo qualche corso, invitiamo loro. Loro ci fanno parte di tutti, uhm, le sue iniziative…

Figure 30

Hierarchy map for the overall references in relation to the themes identified



6.2 Step 2: Design

6.2.1 Overview and Reflexivity

During the second step of Phase 2 of the research process (see Figure 15, in chapter 5), teachers' autonomously designed MAR activities on the Metaverse Studio platform with the support of the tutorials developed by the researcher (the link to the tutorials is reported at the end of paragraph 5.4). In order to collect information regarding the purposes and the values which participants assigned to the open-source tool during this crucial phase of the contextualization process, teachers were invited to participate to individual online semi-structured interviews. As reported in the information sheet that teachers received together with the consent form (Appendix 2), participation to the interviews was voluntary. Perhaps for this reason, and considering the time concerns which teachers clearly expressed during the first OFGs, together with the possible anxieties regarding the experience of being interviewed and videorecorded, only three teachers from two different institutions decided to participate to the interviews. Moreover, T2 and T6 demanded to be interviewed together, since they were working in peers on the development of the activities.

Overall, teachers described the design phase as an entertaining experience during which they enjoyed the flexibility of the software, not only for its accessibility in terms of activities' development (as reported in chapter 5.4, indeed, the software does not require teachers to be able to code, for example), but also for the possibility to be implemented for various learning objectives, from grammar, to lexicon, to cultural contents. Moreover, the tutorials resulted to be an important support for them, which made the process of learning easier and more enjoyable. However, participants also experienced some difficulties during the design process, mainly related to the fact that, excluding the tutorials developed by the researcher, the majority of materials available online and all the instructions of the platform are completely in English. Furthermore, teachers confirmed their initial concerns regarding their institutions' Wi-Fi infrastructures, as well as the problems related to the functioning of the Metaverse App with Android smartphones.

Researcher's reflexivity box

As for the OFGs, and generally for the entire research process, during this phase of the study my reflections were mainly focused on the fact that my previous experience as an Italian Language teacher in Argentina played a crucial role in structuring data collection and analysis, as well as the entire research. Given my experience as a teacher in the Country, I was aware of the possibility that some teachers could have experienced problems in working in English, as data confirmed afterwards. Therefore, I decided to realize tutorials in Italian in order to support participants during the design phase. The usefulness of the decision was confirmed by the OFGs as well, during which teachers underlined the lack of training or support in implementing technologies at school. Moreover, only the youngest teacher declared to know AR before the study, while all of them said they had never implemented it before. Therefore, I thought that some kind of support, together with my predisposition to help during the design phase, was needed. In conclusion, I want to acknowledge and highlight the role played by the tutorials in supporting teachers and, consequently, in helping them to have a positive experience of the design, which could have been completely different if they had to independently access materials available online.

6.2.2 Theme 1: Enjoyable experience of AR design

As it can be observed in the word frequency query represented by the word cloud below in Figure 31, overall the experience of AR design was positive for the participants. The most frequent word is "bene" (good), which occurred 18 times and which is followed by the words "tutorials" and "attività" (activity/ies). Teachers seemed enthusiastic, expressing comments like "Perfect. Well, with the App and with the web site…great! I am…I am feeling comfortable with it! (T3)[39]", or communicating the eagerness to learn more regarding the features of the App than the basics explained in the tutorials. T6 for example said: "Ehm, well, in fact, we are very enthusiastic. We liked it so much:: because one discovers that with these applications you can do everything! You can present any

[39] Perfetto. Allora con l'app e anzi con il sito…Ottimo. Mi.. mi ci sto trovando molto bene (T3)

type of theme, of::: thematic. So it is really interesting, but ehm:: there is… especially, this is a personal thing, I would like to learn other activities, you know? Because, what you told us is true: 'I do not want to complicate the situation, so I will present some of the basic activities that you can design', but I saw that there are a lot of other activities where you can use, for example::: one can take a:: a selfie! And I would like to know how to do it...[40]".

Figure 31

Word cloud of the Individual semi-structures interviews on the experience of MAR activities design

[40] IN6: Eh infatti, no siamo molto entusiasti. Ci è piaciuto tanto:: perché uno scopre che giustamente con queste applicazioni puoi fare di tutto! Puoi presentare qualsiasi tipo di tema, di::: di tematica:: quindi è veramente interessante, però eh::: cioè particolarmente, questa è una cosa personale, mi piacerebbe imparare altre attività capito? Perché cioè quello che infatti tu ci hai detto::: è vero, "non voglio forse complicare la situazione quindi vi presento alcune delle attività che potete fare" però ho visto che ci sono un sacco di altre attività dove si può utilizzare per esempio::: una può scattare una, una selfie. E per esempio questo volevo imparare…

The positiveness of the experience of design seems to be linked to two aspects which are well resumed in the second two more frequent words named above (tutorials and activity). On the one hand, indeed, teachers appreciated the supportive role of the tutorials sent to them and, on the other, they positively valued the flexibility of the tool itself. This last aspect is represented by the sub-theme 'Flexibility of the Metaverse' and it clusters all teachers' comments regarding the variety of possibilities that the Metaverse offers to work with many different contents and for a number of objectives. "Since we work together with the first year of the secondary school, we decided to do a project together. With the book, as I told you, 'Pasta for two', ok? We started this year with the book and…not only from the point of view of the vocabulary, but also regarding the grammar. So we want to reinforce some linguistic aspects[41]", said T2, while T3 commented "Well, for the [*says the name of the school where she works*] I was thinking… because it is the week of the Italian language [*in the world*] and…and this year the theme is the Italian language of young people, so I was thinking to work on this thematic[42]". Therefore, overall according to teachers' experiences, it is possible to design MAR activities with the Metaverse tool for grammar, as well as for vocabulary or cultural activities.

Furthermore, there is another aspect that participants underlined in reporting their experience of MAR design with the Metaverse, being this the possibility to create and upload characters, audio and video contents created by them. T6 said "And there is the possibility to upload them [*new characters*], so.. this is.. something good[43]", while T2 commented "Yes, indeed the characters, no? You can see the Thai girl with the typical

[41] IN: 2 siccome lavoriamo insieme con il primo anno del secondo, abbiamo pensato a fare un progetto tutti e due. Con il libro, come ti dicevo "Pasta per due", eh? Abbiamo cominciato quest'anno con il lavoro e:: non solo dal punto di vista del lessico, ma anche grammaticale. Allora vogliamo rinforzare qualche aspetto linguistico.

[42] IN:3 Ecco per la [dice il nome della scuola dove lavora] avevo pensato visto che è la settimana della lingua e… e l'argomento quest'anno è l'italiano e i giovani, lavorare su di questo

[43] IN:6 E anche c'è la possibilità di caricarli, quindi questa è una::: una bella cosa

face of Thailand, instead the other guy is different, then I said maybe we can find on the web an image of her, download it and put it for her character[44].

As we have already underlined, the third most frequent word during the individual interviews was 'tutorials'. This type of support was particularly appreciated by the teachers as showed in their comments. T2 for example said "Yes yes, well… for what it was:: my experience, me too, when I found this:: this documents, I said to myself this will definitely be difficult because there were so many tutorials, you know? And then little by little, when I started watching them… well, you made them very well, you made them very easy to work with![45]". T6 commented "Well nothing, I mean, as a first encounter with this document, I said 'My Lord, what will be waiting for us! Then, when::: nothing, when I began to work with them and I wanted to do…well, mine was a simple activity, I did it, and it succeeded:: it came out well, so I continued with the others…to watch the other video tutorials ehm:: and nothing, I mean, really, I did it so, I could do it without any kind of problem, so..[46]", while T3 observed "No, actually it was very easy because as a first step I checked the tutorials that you sent, so it was really helpful[47]".

Even though the overall design step is described by participants positively, they also experienced some complications, which were grouped under the sub-theme 'Difficulties experienced'. The major difficulty was indeed related to the fact that, except for the tutorials developed by the researcher, the material available online to learn how to use the Metaverse was all in English. T6 told "I have to say::: I have to say that even though I am an English teacher, when I said yes, when I discovered that everything:::

[44] IN:2 Sì infatti i personaggi, no? Si vede la ragazza thailandese con la faccia tipica della Thailandia, invece l'altro ragazzo è diverso, allora dicevo forse possiamo trovare magari in internet un'immagine di lei, scaricarla e metterla proprio come il suo personaggio.

[45]IN:2 Sì sì, allora parlo::: cioè, per quella che è stata:: come è stata la mia esperienza, e anch'io quando ho trovato questa:: e questi documenti, ho detto questo sarà sicuramente difficile perché c'erano tanti tutorial, no? E poi a poco a poco quando ho cominciato a vederli e::: l'hai fatto veramente bene hai fatto benissimo per poterci lavorare.

[46]IN6: allora niente, cioè, come primo incontro con questo documento, ho detto Madonna mia che cosa ci aspetterà! Poi invece quando::: niente, anche io ho cominciato a lavorare e le volevo fare no? La mia è una sorta di lavoretto, l'ho fatto, ed è riuscito:: è venuto bene, quindi a poco a poco ho continuato con gli altri:: a guardare gli altri video tutorial e:: e niente, cioè, veramente, l'ho fatto in modo da poter farlo senza nessun tipo di problema, quindi.

[47] IN3: No, in realtà è stato molto semplice perché come prima cosa e ho visto i tutorials che hai inviato, quindi è stato di aiuto.

practically all the material was in English, well this was a problem![48]". Therefore, teachers were scared by this linguistic barrier that, as previously underlined, the tutorials helped to overcome. Also T2 commented that "At the beginning, as she says [*referring to the colleague*], when I saw everything in English I thought it's good that we are a group and you can speak English, you know it! At least between the two of us we can do something! Then, no. When we started to watch the tutorials, ok, Italian is different, it is more…it is different[49]". Moreover, T3, answering to the interviewer question related to what they would do to improve the App, answered: "Ah another thing, maybe that the App is in English. I have no problems, but maybe some words I had to go and look for them, and then maybe for another person it could bring a little more difficulties[50]".

Teacher 3 also underlined the fact that she experienced various problems in testing the activities she was designing because she did not have an iOS device to do it. Even though among the three participants she was the only teacher commenting the issue, it was coded and inserted in the sub-themes and codes structure, as it can be seen in Figure 32, because it was already highlighted during the OFGs and, as previously commented in that context, it is a topic particularly relevant for the research outcomes.

As in the case of the teachers' concerns regarding iOS devices and the Metaverse functioning, the last code for the sub-theme 'Difficulties experienced' confirms teachers anxieties in relation to the Wi-Fi issue, a worry already expressed during the OFGs. Again, T3 seemed particularly anxious regarding this aspect, as she expressed in her comment "Yes, well especially this fact that it is not compatible with all smartphones and I know that Wi-Fi is necessary, otherwise it doesn't work…or mobile data... and at school we do not have Wi-Fi so it will definitely depend on the fact that students have 4G, 5G...

[48] In.6: Devo dire::: devo dire che anche se sono professoressa di di di inglese, quando ho detto sì, sapere che tutto::: praticamente tutto il materiale si trova in inglese, questo è stato un problema!

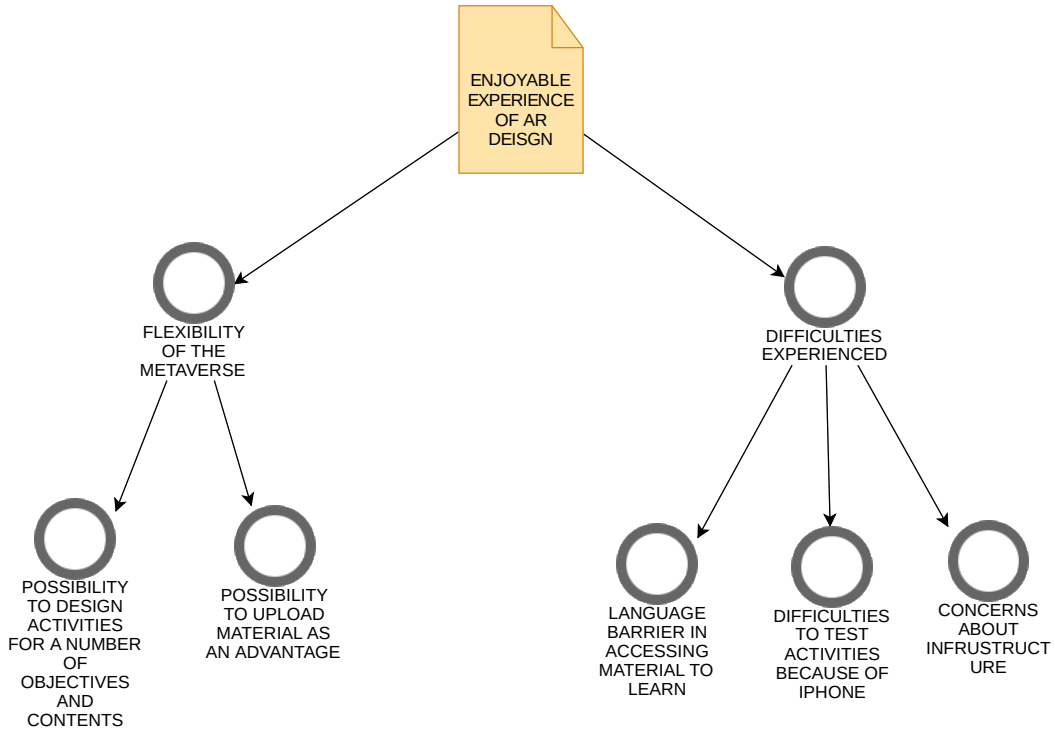
[49] IN2: All'inizio come dice lei quando ho visto tutto in inglese ho detto meno male che siamo un gruppo e che tu parli l'inglese, lo conosci! Almeno tra tutti e due possiamo fare qualcosa! Invece no. Quando abbiamo cominciato a vedere i tuoi tutorials, ok, l'italiano è diverso, più…sì diverso.

[50] IN3 Ah un'altra cosa, magari che l'App è in inglese. Io non ho problemi, ma magari alcune parole sono dovuta andare a cercarle e quindi magari per un'altra persona potrebbe portare un po' più di difficoltà.

and this might be the difficulty, I know that this is not something you can fix because by now all the Apps work like this, but it's something we have to consider[51]".

Figure 32

Theme, sub-themes and codes structure for the theme 'Enjoyable Experience of AR design'



As for the first step of the data collection phase of the study, overall teachers seemed to have had a positive experience. The process of learning how to design AR activities did not result stressful or time consuming, for the flexibility of the App implemented, as well as for the support provided by the tutorials developed by the researcher. However, some difficulties were experienced as well. On the one hand,

[51] IN3: Sì, soprattutto questo…il fatto che non possa essere accessibili a tutti i telefoni e lo so che ci vuole il Wi-Fi perché se no, non funziona…oppure i, i dati mobili ehm… e a scuola noi non abbiamo Wi-Fi, quindi sì o sì dipenderà dal fatto che i ragazzi abbiano 4G, 5G insomma…e che potrebbe essere la difficoltà, lo so che questa non è una cosa che si possa risolvere perché ormai tutte le App funzionano attraverso questo…Ma è anche una cosa da avere in considerazione!

teachers had to face the linguistic barriers of the materials available to independently learn more features about the Metaverse App. On the other, participants had troubles in testing the activities with iOS devices. Moreover, the concerns regarding the efficiency of school Wi-Fi and the availability of students' personal mobile data expressed during the OFGs were confirmed during this step as well.

The following stage of the research design was the implementation in classroom of the MAR activities designed by the teachers, which is described in the following paragraph through the results of the observations in classroom.

6.3 Step-3: Classroom Implementation

6.3.1 Description and Reflexivity

In this section data will be presented by reporting the field notes collected by the researcher in the form of a descriptive narrative. Therefore, there are no themes or codes to be presented. Moreover, after reporting the information collected, a short reflexivity box is presented. After approaching the Metaverse platform and designing the activities, during the step 3 participants implemented them in their classrooms. The researcher was able to participate to the implementations as an observer, collecting field notes in the form of unstructured notes. Some pictures of students playing with the Metaverse App were realized as well. Almost all the teachers moved from their regular classrooms to implement the Metaverse activities, mainly because of issues related to the power of the Wi-Fi connection. Moreover, some teachers decided to merge their classes in order to have their students live a different type of experience. Furthermore, they also tried to work in groups in order to avoid Wi-Fi connection problems, a concern which, as largely described, worried teachers since the beginning of the research project. Therefore, all the teachers which participated to the study had their students' work in groups. These details are reported in Table 10 below.

Table 11

Teachers' strategies to implement the Metaverse in classroom

Participants	N. of classes	Did students move outside the regular classroom?	Did teachers merge classrooms?	Did students work in groups?
T2	2	Yes	Yes	Yes
T3	3	Yes, only for one institution	No	Yes
T6	2	Yes	Yes	Yes
T7	2	Yes	Yes	Yes
T8	2	Yes	Yes	Yes
T9	2	Yes	Yes	Yes

Overall, both teachers and students were enthusiastic about the experience, as they confirmed afterwards in the post implementation semi-structured interviews. In the cases in which they were in the same institutions, teachers collaborated with their colleagues not only for the design, but also for the implementation of the activities, merging their classes together, having their students work collaboratively and organizing spaces and timetables according to their needs. The only teacher that did not work in collaboration was teacher 3, since she worked in two different institutions and she was the only participant from both of them.

Regarding the type of activities, the two participants from the institution in Santa Fe (T2 and T5), designed follow-up activities with both cultural and language-related contents (grammar, vocabulary or language use exercises) for a booklet in Italian that students read during the year, which title was *'Pasta per due'* (Pasta for two). Because of the better functioning of the Wi-Fi available, students were moved from the older to the newest area of the school, where more modern classes had recently been built and they had better Wi-Fi connection. Each teacher merged his/her students from his/her classes and they played in groups, as it can be seen in Figure 33, showing a picture of students working with the activities designed by T2 and T5. Students' pictures where realized and selected maintaining students' anonymity. In the cases in which some specific physical

feature was recognizable, pictures were modified in order to cover them. After the activities, students came back to their regular classrooms.

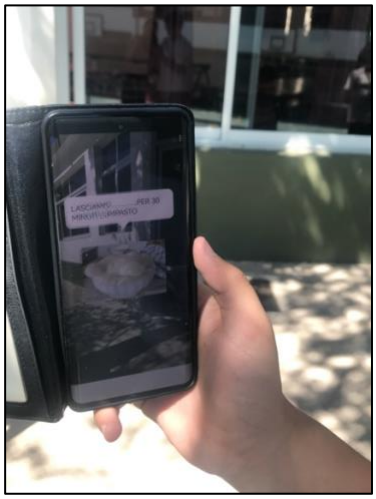
Figure 33

Students playing with the Metaverse App in the classroom

The three teachers from Villa Carlos Paz worked together developing activities on Italian traditional recipes for the *'Settimana della cucina italiana'* (The week of Italian cuisine), an event which lasts an entire week and which is organized every year by the Italian cultural institutions abroad on the same dates around the world. T7, T8 and T9 merged their classes and organized a scavenger hunt in the schoolyard having their students play in groups, as it can be observed in the pictures of Figure 34.

Figure 34

Students playing with the Metaverse App in the schoolyard



As previously underlined, T3 was the only one who worked alone. She participated to the study with three classes, two from one institutions (school #1 in Table 6) and one from another (school #2 in Table 6). For the two classes from the first institution, she decided to move her students to the computer laboratory, because she was afraid of possible Wi-

Fi connection issues. She worked separately with each class, without merging her students and by designing the same activity for the two groups. The activity was based on the topic of language use, and specifically on the slang of adolescents in Italy, with the use of memes or social media characters famous among younger people in Italy nowadays. Similarly to the *'Settimana della cucina italiana'*, this activity was designed to be implemented during the *'Settimana della lingua italiana'* (The week of the Italian Language), an event, again, spread all over the world and organized by the Italian cultural institutions abroad for one week. Regarding the other institution where T3 worked (school #2), because the group of students had gone to Italy during the same year for a school trip, she decided to organize a cultural activity, with quizzes based on the main monuments, squares and historical sites of the most famous Italian cities. For this group, T3 did not move from the classroom, because she was confident on the Wi-Fi of the institution where she was working.

Researcher's reflexivity box

For the implementation phase, my reflections were mainly based on the fact that as a researcher collecting information I did not want to invade the teaching-and-learning environment. Also because I was not a participant observer, I wanted to maintain a neutral position as much as possible. However, it is impossible to consider the presence of a researcher as something that does not influence somehow the learning environment, therefore this fact should be considered when interpreting students' and teachers' experiences of MAR implementation in classroom.

6.4 Step 4: Post-implementation

6.4.1 Overview and Reflexivity

During the last step of the experience, the researcher interviewed teachers after the implementation of the MAR activities which they designed for their students. Overall, participants confirmed their initial beliefs on the tool, and resulted satisfied by the ways in which they contextualized MAR for their classrooms. Teachers focused on the description of MAR advantages and disadvantages in action. Therefore, the two themes

identified for the last online semi-structured interviews are exactly ‘MAR advantages’ and ‘MAR disadvantages’.

Regarding the advantages, teachers confirmed the role of MAR in promoting students’ motivation, as well as the effectiveness of the tool in being implemented for a plethora of tasks, both on cultural and on language related contents. Moreover, participants also confirmed their initial perceptions on the possibility of MAR to enhance students’ perceptions of smartphones as educational tools. Teachers’ satisfaction and the positiveness of the overall experience are also confirmed by the expressed willingness of using the tool in the future, by incorporating it in the regular teaching practice.

Regarding the disadvantages, teachers underlined again the issues related to infrastructural problems, confirming their initial concerns about Wi-Fi connection, as well as about students’ availability of personal devices able to work with the App. However, several teachers reported that they did not experienced connection problems in the way in which they were expecting to, and that overall their students were able to play with the activities they had designed, even if they commented that sometimes the Metaverse App was working slowly. A last aspect to consider relates to the fact that, even though students resulted enthusiastic and motivated about the experience, one participant highlighted the possibility that they could be less interested in the future, if regularly implementing the tool in classroom.

Researcher’s reflexivity box

In this phase of the study, I reflected on the importance to avoid repetitiveness during the analysis, because participants were confirming, or not, their initial beliefs on the tool after implementing it. Therefore, I tried to maintain the focus of the analysis on the importance to try to catch and describe the actual values and purposes that participants aligned (or not) with their practice through the contextualization of MAR, avoiding, at the same time, to be influenced by their initial expectations.

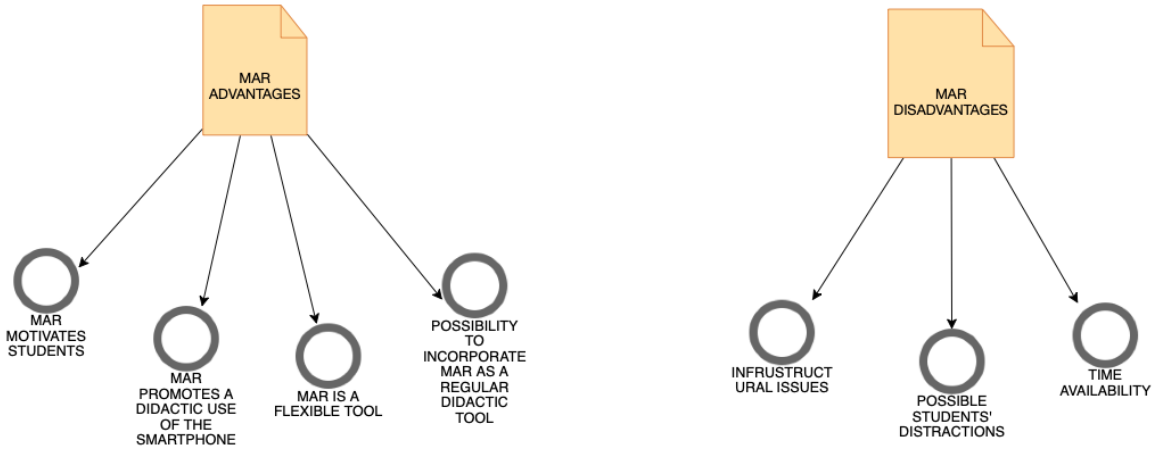
6.4.2 Theme 1: MAR advantages

To the opening question of the interview related to how it was the experience of implementing MAR in classroom, all the participants answered underlining the positive

students' reactions and, consequently, expressing their believe on the tool capability to promote motivation. For this reason, the first code for the theme MAR advantages is 'MAR motivates students', as it can be observed in the themes and codes structure (Figure 35) and in the illustrative extracts reported afterwards. T6 observed: "Look, they were really motivated and when::: obviously for me:: I was amazed because you know, by now... it is a very numerous course and nothing, they were all very engaged with it![52]". T2 commented "They were very enthusiastic because they reviewed things…the places they had visited in Italy, so it seemed great to me. They were really, really happy."

Figure 35

Themes and codes structures for the themes 'MAR advantages' and 'MAR disadvantages'



Related to motivation, is another advantage of MAR according to teachers' perceptions, being its potential to contribute to students' education on implementing smartphones as teaching-and-learning tools. T3 for example said: "Well, as an advantage, I think that being such a new thing… both for me and for the students, I think that for

[52]IN6: Guarda, loro erano veramente molto motivati e quando::: Ovviamente per me:: sono rimasta stupita perché sai ormai… è un corso molto numeroso e niente, comunque erano tutti i ragazzi molto presi

them it is a great motivation, I mean, to be able to work with this, to work with smartphones which nowadays are another tool to be considered for our classes[53]." While T7 added: "No, I think:: It's an evolutionary matter for them, I mean, they must gradually understand that the smartphone is not just for playing and that you can use it for other activities that can be educational, that you can use it at school, that we, as professors, can use them and also they can use it to learn new things. It's a matter of time as well, isn't it?[54]". One possible way to help students conceive smartphones as learning tools could be by having them generate contents for the MAR activities to be implemented, as T7, 8 and 9 did during the design phase, as T8 described: "Because, for example, we told them, well, you have to look for a recipe and then you have to think about a question and an answer related to verbs, ok? Or, you have to prepare a sentence to complete, I don't know... with vocabulary related to the ingredients [*of the recipe*].[55]"

Another advantage which participants identified is related to the flexibility of the tool, a characteristic which confirmed teachers initial beliefs and expectations regarding the Metaverse. Henceforth, all those teachers reflections regarding the possibilities to design a number of different activities for different learning objectives are clustered under the code 'MAR is a flexible tool'. Some examples are reported in the following extracts. T3: "I think it allows you to work with different topics, from cultural contents to the grammar so it is very broad, in this sense[56]." T8 commented: "An advantage, well... that

[53] IN3: Allora come vantaggio penso che essendo una cosa così… tanto nuova sia per me che per i ragazzi, penso che per loro è una grande motivazione, cioè poter lavorare con questo, lavorare con i telefoni che oggi sono un altro strumento da avere in considerazione nelle nostre lezioni.

[54] IN7: No io credo che:: È una questione evolutiva per loro, cioè, devono capire a poco a poco che il cellulare non è solo per giocare e che si può utilizzare per altre attività che possono essere didattiche, che si possono utilizzare a scuola, che ci possiamo servire noi professori e anche loro per poter imparare cose nuove. È una questione di tempo, anche no?

[55] IN8: Perché per esempio noi abbiamo detto, bene, dovete cercare una ricetta e poi dovete fare una domanda-risposta riferita ai verbi, no? O dovete fare una frase per completare, non lo so… con un vocabolario riferito a un ingrediente.

[56] IN3: Penso che ti permetta di poter lavorare con diversi argomenti, dalla parte culturale alla parte grammaticale quindi è molto ampia in questo senso.

you can do an interactive activity with many things and that you can apply it for different tasks, both to see a video, to read a text, etc.[57]".

The possibility to use the tool for designing and implementing a plethora of tasks for language learning seems to be at the base of teachers' willingness to keep using the App in the future. Indeed, teachers discussed the fact that the tool could be easily incorporated into their regular IL teaching practice, for example for follow-up activities or to reinforce grammar or vocabulary, as they highlighted in comments like the one of T6: "Eh, well, I repeat what I said before, I also share what students said, the fact that in my opinion is an application which is…which can be used to present any type of topic. And I like it because I still want to continue to:: to learn other spaces, of course! I mean, other ehm::: other uses of this app. As soon as we have some free time I will. So, nothing, I really liked it![58]". However, answering to the question related to the possibility to implement the tool in the future, one teacher underlined the fact that by implementing the App regularly there could be a risk of bore students by losing the novelty component of AR: " Well yes, but not in all [*the classes*], because sometimes it gets a little repetitive and you get tired, let's say, you should include this surprise component in the lessons. It gets lost sometimes.[59]" (T3).

6.4.3 Theme 2: MAR disadvantages

As for the initial and the design phase of the research study, the main disadvantage which teachers encountered during the implementation of MAR relates to the Wi-Fi infrastructure and to the type of devices required to work with the Metaverse. Therefore,

[57]IN8: Vantaggio eh, bene… che si può fare una cosa interattiva con molte cose e che si può applicare in diverse attività, sia per vedere un video, per leggere un testo, eccetera eccetera.

[58]IN6: Eh, ribadisco quello che ho detto prima, anche io condivido quello che hanno detto i ragazzi, che secondo me è un'applicazione che è:: che può utilizzarsi per presentare qualsiasi tipo di tematica. E mi piace perché ancora vorrei continuare a:: a imparare altri spazi, certo! Altri e::: altri usi di questa applicazione. Appena abbiamo un po' di tempo libero lo farò. Quindi no niente, Mi è piaciuto tantissimo veramente.

[59]IN3: Eh sì, ma non in tutte, perché a volte diventa un po' ripetitivo e ti stanca, diciamo questa parte di sorpresa di includerlo nelle lezioni. Ogni tanto si perde.

the information in the interviews related to these issues were clustered under the code 'Wi-Fi issues'. However, even though several teachers experienced problems related to the internet infrastructures available (see the extracts below for T8 and T7), it must be underlined the fact that many participants were expecting to experience such problems, but they did not, as reported in the extract of T3.

T8: "Yes, we experienced a problem when we uploaded a web page. After that… it was as if it didn't direct to the following::: to the following page and it crashed, so yes, we had this problem. Also with the video, which crashed a bit… it was a bit slow[60]." T7 observed that: "Actually, it is always, for me, it is a matter of the internet, but this would happen not only to this, but to any App, in any activity of which there is::: where it is necessary to use the internet, no? If the internet goes well, the App works well! [*laughs*][61]".

Differently, T3, which was the participant more concerned about the infrastructure and the type of devices available for the entire study, commented: "No, I was surprised that... It also worked with the I-Phone and nothing, all the students could play well by organizing groups with their phones, so...[62]". Moreover, Teacher 6, a participant from an institution different from T3, confirmed the possibility to work in groups as a solution to the internet connection problems she experienced during the implementation: "Ehm:: well, there was the problem of the connection so:: nothing, they had to organize themselves into groups of three, four, five eh, up to five guys… it was, I mean, it was implemented… it was not done during::: in their classrooms I mean, but in another place for this issue indeed, for the Wi-Fi connection, you know? And then they organized themselves into groups, didn't they?[63]" (T6).

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[60]IN8: Sì, abbiamo avuto un problema quando abbiamo messo una pagina web. Dopo non… è come se non dirigeva alla seguente::: alla seguente pagina e si bloccava, quindi sì, abbiamo avuto questo problema. Anche con il video, che si bloccava un po'… era un po' lenta.

[61]IN7: In realtà, sempre per me, è una questione di internet, ma questo capiterebbe non solo a questa, bensì a qualsiasi app, in qualsiasi attività della quale ci sia::: sia necessario utilizzare l'internet, no? Se l'internet va bene, la app funziona bene! [ride]

[62]IN3: No infatti mi ha sorpreso il fatto che…funzionava pure con l'i-Phone e ma niente, tutti i ragazzi hanno potuto giocare bene facendo dei gruppi con i loro telefoni, quindi…

[63]IN6: Ee:: beh, c'è stato però il problema del collegamento quindi:: niente, dovevano organizzarsi in gruppi di tre, quattro, cinque eh, fino a cinque ragazzi… è stata, cioè, implementata… non è che è stato fatto

The last two disadvantages which teachers experienced were already expressed in form of concerns at the beginning of the study, and they are respectively the 'Possible students' distractions' and the 'Time availability'. Regarding the fact that students could be spending time on social media or on other activities instead of playing with the MAR App, T3 and T6 commented, for example: "I mean, all these things... well, one cannot check 30 students to see if they really are::: if they are reading the pdf or if they are on Instagram, so it is difficult to manage for sure, but I think that in an activity like this type, in which they are all involved, I don't think they jump from one thing to another. So let's say it's an experience that allows you to stay all the time on::: Maybe someone doesn't do the activity, he/she is on another… but I think it doesn't happen that much[64]" (T3). And T6 commented: "Well, then, and I think there's this: It was a real challenge because you know, we, as teachers sometimes, I mean…We often refuse the idea of:: to use the mobile phone in the classroom because with this, that is, we are afraid of this fear that the students can in fact lose:: or get lost... with other things, which are not the:: the thematic we are working on, right? I mean social networks and so on".

Regarding the issue of time availability, a particularly interesting comment was done again by T6 when, at the conclusion of the interview, the researcher asked if she wanted to add something: "No, I… what I told you before, right? That for me it was a... nothing, a challenge and:: because:: as we have already said the other times, it is not easy sometimes to find the time to put yourself there to study, to listen, to study the tutorials, you know?[65]". However, although the difficulties experienced, by looking at the hierarchy map in Figure 36, which compares the codes identified to the number of references, it is

durante::: proprio nelle aule, ma in un altro posto giustamente per questa cosa, per il discorso del collegamento, no? E poi sono stati loro ad organizzarsi in gruppi, no?

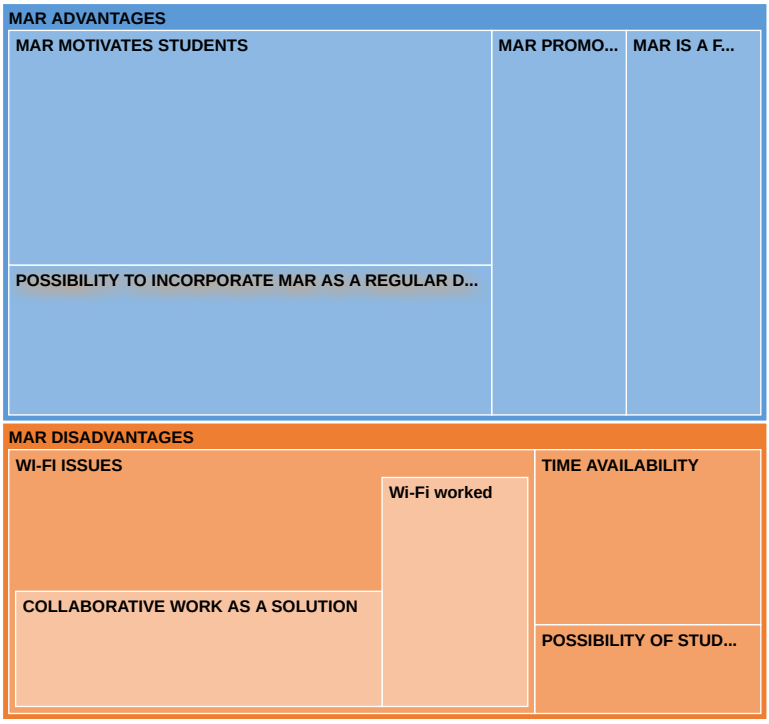
[64]IN3: Cioè, tutte queste cose…quindi uno non è che può controllare 30 ragazzi per vedere se veramente stanno::: stanno leggendo il pdf o stanno su Instagram, quindi è difficile da gestire senz'altro, ma penso che in un'attività del genere, nella quale sono tutti coinvolti, non penso che saltino da una cosa all'altra. Quindi diciamo è un'esperienza che ti permette di stare tutto il tempo sulla::: Può darsi che qualcuno non faccia l'attività, stia su un'altra…ma penso che non succeda tanto.

[65]IN6: No, io:: quello che ti ho detto prima no? che per me è stato un.. niente, una sfida e:: perché come abbiamo già parlato altre volte, non è facile trovare a volte il momento per metterti lì a studiare, ascoltare, studiare i tutorial, no?

possible to observe that the references for the advantages of MAR implementation are more than those related to the disadvantages.

Figure 36

Hierarchy map for the overall references in relation to the themes identified for the post-implementation interviews



SECTION 4 -

CONCLUSIONS AND DISCUSSION

4 CONCLUSIONS AND DISCUSSION

The results presented in the previous section are here discussed in relation to the aims and to the research questions, to the wider scientific context as well as to the limits and the future directions of the research study. The detailed exploration of the overall experience of MAR contextualization in terms of tinkering (Bardone et al., 2023) and from an Entangled Pedagogy perspective (Fawns, 2022), was necessary to achieve the first aim of the study, consisting of an understanding of teachers' needs *in action*. From the identification of such teachers' needs and by considering the overall experience it was possible to derive a set of guidelines in the form of suggestions for both IL teachers and MAR designers, a process which allowed to pursue the second objective of the study and to answer to the Overarching Question. Indeed, as (Goodyear & Carvalho, 2019) underlined, the construction of actionable knowledge on the implementation of emergent technologies as educational tools, implies a complex analysis of the relationships among the elements involved in a teaching-and-learning environment, to be conducted by situated observation and, henceforth, based on evidence (Goodyear & Carvalho, 2019).

Therefore, the study of tool contextualization as tinkering was conducted by an exploration of teachers' conversation with the situation (Holmberg, 2014) in terms of values and purposes in action, which participants attributed to MAR for the ILTAL. Because purposes and values are at the basis of the decisions which teachers undertake on tasks, methods, technologies, design and practice, and because values are attitudes and beliefs regarding what is consider relevant for the teaching practice (Fawns, 2022), it is fundamental for teachers to try to pursue an alignment between values and purposes and their teaching practice (Dron, 2022). Henceforth, teachers' purposes and values were explored in this study through the constructs of Teacher Attitudes, Teacher Pedagogical Beliefs (with a focus on Perceived Usefulness and Perceived Ease of Use) together with Anxiety and Comfort. The entire analysis and discussion are, therefore, structured on the comparison between the initial TA and TPB and the actual values which teachers attributed to the contextualization of MAR in terms of PU and PEU, in relation to AC and to the External Agents, in order to understand how (and if) participants pursued an alignment between their perceived values and beliefs and their practices in classroom.

Furthermore, in the development of the study and specifically of the analysis, the characteristics of the context were always considered, since they are part of the set of External Agents able to shape the implementation of a digital tool in a learning environment and, therefore, to the affect the teachers' attribution of values and purposes to a specific tool. By considering all the aspects here discussed, it was possible to answer to the first and the third RQs. Furthermore, by answering to the second RQ, the study described the general process of MAR activities design as experienced by the participants, which is, on the one hand, a fundamental part of the entanglement of a technology in classroom and, on the other, an important moment to collect information on actual needs when it comes to technological tools design and implementation.

7.1 General Discussion

As it was possible to observe from the presentation of the results, overall the IL teachers in Argentina who participated to the research study showed positive attitudes towards the experience of contextualizing MAR for the ILTAL. Participants were enthusiastic since the beginning of their collaboration with the researcher, even though some concerns were also expressed. In order to explore, describe and interpret the reasons for the general positive teacher attitudes (and the related theme and sub-themes identified) it is useful to consider one of the major gaps in the literature on AR implementation for language learning. According to Khoshnevisan (2021) "educators are predominantly unfamiliar with an emerging technology such as AR" (s.d., p. 72) and more empirical studies on the process of AR content design conducted by educators are needed. Therefore, AR consists of (and it is mostly perceived as) a novelty for teachers.

This observation acquires even more significance when the macro and the micro contexts of the research study are considered. As Fawns (2022) underlines, indeed, it is necessary to consider a holistic approach to ET, where technology is conceptualized in its *situated* nature, and where, therefore, social, cultural and a number of contextual factors are considered at the moment of its implementation for educational purposes. As largely discussed in the literature review section of the thesis, the rapid technological

developments of our time are profoundly and continuously changing our society (Bates, 2019), consisting of a major force of social, political and economic transformation (Castañeda et al., 2020). Consequently, emerging technologies are modifying our concept of what constitutes a teaching-and-learning environment. Therefore, teachers' positive attitudes towards the entangling of MAR for the ILTAL must be interpreted considering the novelty component which the experience, by involving the implementation of such emergent technology, contains.

Regarding the micro context of the study, another reflection is worth doing when observing teachers' enthusiasm towards the experience. Only the youngest teacher among the participants knew AR before the research study. Except for her, the other five teachers were among 32 and 49 years old. This information already suggests that the level of exposure to emergent technologies of older teachers is lower than the participant in her twenties. Is it therefore possible that the novelty component of AR was particularly perceived by the participants of this study, since only one knew the technology before. Henceforth, a consideration of the macro and the micro contexts are fundamental in interpreting teachers' reactions to the entanglement of AR, since they enable to observe the phenomenon from a wider perspective (Fawns, 2022; Castañeda et al., 2022).

Another factor to consider in order to explain teachers' positive attitudes towards AR relates to the consequences of Covid-19 pandemic on classroom management. which teachers largely discussed during the initial OFGs. Participants themselves explicitly stated that the Pandemic was "actually a very positive experience" (T5), since it accelerated the acquisition of new technological knowledge and skills for them. Therefore, teachers' initial positive attitudes should be interpreted not only by considering the novelty component of the technology itself in relation to the macro and micro contexts of the participants, but also the positive consequences of the Pandemic which, by forcing teachers to experience new digital ways of classroom management, made them feel more confident and less anxious at the moment of reflecting on how to entangle a more complicated technology such as AR in their practice.

Together with the consequences of the Pandemic on teachers' technological knowledge and skills development, participants highlighted another positive influence of the Covid-19 on the teaching-and-learning environment, being this the promotion of

smartphones use in classroom for pedagogical purposes. Teachers underlined the fact that, since after the Pandemic, students are always more used to implement their smartphones to store learning materials or to perform tasks, because mobile phones "since the Pandemic are a crucial part of their learning" and they are now "not as an extra resource, but they are practically like a book […]. It has become something that must be always part of the lesson." (T3).

Therefore, in considering this specific consequence of the Pandemic, teachers reflected on the fact that, being AR implemented through mobile devices, an added value of this emergent technology could be the improvement of an appropriate and responsible implementation of smartphones, which, consequently, will help students in the process of perceive these devices as learning tools. T4 indeed commented "They spend all their time sticking to their phones! So a proposal of this type I believe…well I think it is up-to-date, nice, interesting and also positive!". This aspect is in line with studies which confirm the efficiency of mobile technologies in supporting formal classroom teaching, since they allow students to access information quickly, they provide a multimedia input, they increase students' engagement and they favour collaboration with peers and teachers (Morgana & Kukulska-Hulme, 2021; Sun & Gao, 2020).

A fundamental element to consider in explaining teacher positive attitudes relates to the perceived advantages of MAR. The discussion on this aspect is particularly interesting in the scope of this research study, which embraces the perspective of the Entagled Pedagogy Model developed by Fawns (2022). Because pedagogy is formed not only by methods and technology, but also by the purposes, the contexts and the values of educators *in action* (Fawns, 2022), the observation of the initial perceived advantages of MAR according to teachers' perspective allowed to explore the ways in which teachers' aligned their values to their practices during the process of MAR contextualization in terms of tinkering (Bardone et al., 2023).

Together with purposes, values are the basis of educators' decisions and they are beliefs regarding what is considered relevant in a teaching-and-learning experience (Dron, 2022; Fawns, 2022; K. Lee, 2021; S.-M. Lee, 2019). Moreover, values are influenced and shaped by the development of practice and by the characteristics of the context. Consequently, educators should make an effort to align their teaching practice

with their values in a number of contexts. Because contexts are changeable and influenced by a plethora of agents involved in the process of tool contextualization (such as infrastructures or learning materials), and because values also depend on internal reasons such as attitudes, beliefs, expertise or skills of educators, the possibility to put values in practice is not always achievable. However, this alignment should be always pursued, because values inform decisions on tasks, contents, teaching methods, technologies, design and practice and should therefore always be explicitly shared and articulated (Dron, 2022; Fawns, 2022).

Therefore, by the initial exploration of TA and TPB, it was possible to observe that, according to participants' perspective, one of the major possible values of MAR consists of its capability to promote students' motivation. The PU of the entanglement of MAR in terms of improvement of motivation was confirmed in the last phase of the study, when teachers implemented the activities that they designed for their classrooms. Therefore, during the study it was possible to observe how teachers' aligned their values with their practice, by designing activities that were able to promote students' motivation. As it can be seen in the hierarchy map at at Figure 36 and from the related extracts for the theme 'MAR advantages', indeed, after using MAR in classroom in the post-implementation interviews (paragraph 6.4) teachers confirmed their initial reflections and beliefs with comments like "Look, they were really motivated and when::: obviously for me:: I was amazed because you know, by now... it is a very numerous course and nothing, they were all very engaged with it!" (T6). The fact that TPB confirmed MAR as a valuable tool for the purpose of promoting students' motivation by creating a more engaging teaching-and-learning environment is in line with studies which demonstrated how AR positively affects students' motivation and engagement (Pan et al., 2021; Taşkıran, 2019).

Another perceived advantage of MAR according to initial TPB during the OFGs is the promotion of a better teacher-students relation. Several teachers expressed the believe that working with this type of technology could make them feel closer to students' realities, "Because students, students are already there, in a new world" (T7), which is virtual and interactive. Teachers discussed the fact that, by learning how to use AR, they could improve their confidence at the moment of working with technology, consequently enhancing their relation with students. In other words, teachers attributed to MAR the

value of a technology able to improve their relations with students through the development of their digital skills and knowledge. Differently form the perceived advantage on motivation, this value not resulted aligned with their teaching practice, or at least, the alignment was not visible in the context of the current study. This could be due to the necessity for more time, and therefore of longitudinal studies, to observe a developing of teachers-students relations through the regular implementation of MAR in the classroom.

However, another initial TPB which was confirmed as an advantage of MAR through practice, is the idea that implementing AR through mobile devices can educate students to a more responsible use of smartphones as learning tools, a belief expressed by the participants when discussing the positive consequences of the Covid-19 pandemic on students' smartphones implementation, as previously discussed. When situating MAR in classroom, teachers aligned this value with two practices. During the design phase, T7, 8 and 9 had their students generate contents for the MAR activities to be implemented afterwards, by asking them to look for information on Italian traditional recipes and to prepare questions for their peers. The other teaching practice was group work. If at the beginning of the study only few teachers' were attributing to MAR the value to promote collaborative work, when placing MAR in context, they all implemented the activities they designed through collaborative work, as it can be seen from the extracts, from the observations and from the consideration in the post-implementation interviews. This aspect is in line with studies which confirm that AR promotes collaboration among stakeholders (Akçayır & Akçayır, 2017; Sydorenko et al., 2019).

Therefore, the discussion on the perceived advantages of MAR just conducted here brings to a fundamental consideration in the scope of the EP model. It is possible that, when initially approaching an emergent technology (such as AR) teachers may not perceive all the possible values of that technology until they entangle it through practice. It is therefore crucial not to adopt deterministic and essentialist positions when it comes to technology implementation, because this fact demonstrate how goals and outcomes cannot be fully specified in advance (Bardone et al., 2023; Fawns, 2022; Dron, 2022). The entanglement of a technology is a process which incorporates 'the mutual shaping of technology, teaching methods, purposes, values and context'(Fawns, 2022, p. 711).

Henceforth, the perspective of the Entangled Pedagogy results to be an efficient lent through which observe the process of tools' contextualization, because it shows how it consists of a collective, complex process "where agency is negotiated between teachers, students and other stakeholders" and where "Outcomes are contingent on complex relations and cannot be determined in advance" (Fawns, 2022, p. 711). Furthermore, interpreting teachers' decisions from such a perspective, shows how useful it is to conceive tool contextualization in terms of tinkering (Bardone et al., 2023), because it consists of an adaptive, unplanned, responsive process to what happens *in action,* and therefore it allows to observe how teachers reflect on, and undertake decisions with, the situation at hand. Henceforth, by observing teachers during the process of tool contextualization conceived in terms of tinkering, it is possible to determine and understand teachers' needs *in action* regarding the implementation of a specific technology. As authors like Dron, (2022), Fawns (2022), Holmberg (2014), Bardone et al., (2023) underlined, indeed, by investigating situated teacher reflections on their educational use of digital technologies it is possible to overcome the educational research-practice dichotomy and to produce actionable knowledge. Only by looking at and reflecting on the situated relations of entangled elements involved in the teaching and learning ecosystems, as well as on the values given by the actors of the ecosystem to each different element of it, a collective, responsive and actionable knowledge can be produced (Markauskaite et al., 2021).

Teachers' positive attitudes and beliefs towards MAR were also confirmed by the explicit willingness of teachers to implement the tool in the future and to entangle it into their regular teaching practice. Only one teacher expressed the concern that, by regularly implementing the tool, there could be a risk that students will be bored by it. The last advantage which teachers attributed to MAR relates to the specific characteristics of the open-source tool implemented, which Perceived Ease of Use according to participants' perspectives consists of its possibility to be adopted for a number of activities and learning objectives. However, together with teachers' overall positive beliefs on MAR contextualization for the ILTAL, several concerns were expressed since the beginning of the research study and some of them were confirmed as disadvantages of MAR through classroom practice, in the same way in which it happened for the positive values attributed to the technology. By looking at teachers'

concerns and perceived disadvantages, it is once again clear the importance of considering the role of the social and cultural context in shaping the experience of digital tools' contextualization. Therefore, conceiving the introduction of a technology in a teaching-and-learning environment as an holistic tinkering process which involves a number of factors from the micro and macro context, allows, again, to understand the *actual* teachers' experiences.

The main issue underlined by teachers is indeed related to the infrastructures available at their institutions. As previously underlined in this work, two of the participants abandoned the study after the first OFGs because of their lack of trustworthiness in the Wi-Fi functioning at their schools. Moreover, even if after the implementation in classroom some teachers where surprised by the fact that the Wi-Fi connection worked, it is also true that almost all of them moved from their habitual classes to other places of their institutions in order to have better internet connection, as described in the results of the observations. Henceforth, infrastructural issues were not simply initial teachers' concerns, but they were also confirmed as MAR disadvantages at the end of the overall experience.

Another interesting result relates to the fact that during the first OFGs one teacher expressed her preoccupation regarding the possible difficulty to implement the App because the majority of her students' had iPhones. As discussed in the methodology section, the Metaverse presented several issues when it was accessed with iOS devices, while it worked perfectly when used with Androids. Even though during the implementation phase the App worked with iPhones as well sometimes, the teacher highlighted an aspect which is fundamental to consider at the moment of designing AR platforms. To the issues regarding Wi-Fi accessibility and the types of smartphone devices available is related another aspect that should be considered when contextualizing MAR for the teaching-and-learning practice. Several participants were worried about students' willingness to use their own personal mobile data to play with the Metaverse. However, it must be highlighted that during the implementation students did not express resistance when the Wi-Fi connection worked badly and they were asked to use their personal data. Therefore, even though the matter is worth considering, it was not perceived as a disadvantage by the participants in the context of this study.

On the contrary, several teachers indicated as a concern, firstly, and as a downside, after classroom implementation, the fact that students could be distracted by social media, messaging or other uses of their mobile devices different from the MAR activities. Even though, once again, group work was adopted as a solution to this perceived issue, this aspect would benefit from more studies on the upsides and downsides of smartphones implementation for language learning, as underlined by Metruk (2022).

The last two concerns which teachers experienced, and which are to be interpreted considering how strongly the entanglement of technology and pedagogy is related to economic and cultural factors (Fawns, 2022), relate to the lack of teacher training on new technologies, as well as to teachers time availability. Especially this last aspect was crucial during the entire study. As largely discussed in a number of sections of this thesis, specifically for the Argentinian social and economic context, teachers' time availability is a factor that cannot be underestimated. The time availability is so important that it was also perceived as a disadvantage. Together with the lack of teacher training and with time availability, teachers' worries regarding the perceived difficulties to learn how to design for MAR is another crucial feature, since it suggests the necessity to support the learning process with materials able to reduce the time and resources which teachers are supposed to implement when deciding to use MAR for their teaching. This aspect is confirmed by the Perceived Usefulness of the tutorials, which all teachers underlined, as visible from the extracts and from the code structures.

The Perceived Usefulness of the tutorials also influenced the Perceived Ease of Use of the specific Metaverse tool and brings the discussion to the aspects related to teachers' experience of design. Overall teachers described it as a positive practice, especially for the accessibility and the versability of the tool, which was easy to align to different learning objectives. Moreover, participants particularly appreciated the possibility to create their own characters, to upload their own music, audios, memes or Bitmojis in order to make the activities more entertainment for students. However, participants underlined one crucial obstacle which is fundamental to contemplate at the moment of designing AR platforms for educators, being this the linguistic barrier. All the teachers highlighted the difficulties experienced because all the instructions and all the learning material available online were in English and, therefore, they underlined the

crucial support represented by the tutorials in Italian developed by the researcher. Together with language related issues, teachers underlined again some difficulties experienced in testing the activities because the platform worked badly with iOS devices.

In conclusion, the deep exploration of the overall experience of MAR contextualization in terms of tinkering allowed to describe the values and purposes which teachers' attributed to the MAR tool for the ILTAL during the contextualization process itself, enabling the identification and the understanding of teachers' needs *in action*. Consequently, after pursuing the first aim of the study, such a detailed exploration of teachers' experiences enabled the achievement of the second objective of the research, which consisted of the identification of a set of guidelines in the form of suggestions based on evidence (Goodyear & Carvalho, 2019), which can be conceived as aspects to be prioritized at the moment of contextualizing MAR with an open-source authoring tool for the ILTAL, and which are presented described in the next paragraph.

7.2 Guidelines for the implementation of MAR for the ILTAL

The exploration and description of teachers' experience of MAR contextualization allowed to reflect on technology implementation *in use*. The implications of the introduction of technologies in a teaching and learning ecosystem are undeniable and the EP perspective allowed to conceive such implications in their *situated* social and material dimensions, including the role of policies, practices and cultures in which they are embedded (Barad, 2007; Fawns, 2022). The study of situated teacher reflections on their educational use of digital technologies should lead to a narrowing of educational research-practice dichotomy and to the production of actionable knowledge (Holmberg, 2014; Fawn, 2022; Dron, 2021). In the scope of this study, such knowledge is conceived as the identification of the main aspects to prioritize for the implementation of MAR for the ILTAL, as well as for the design of MAR platforms for language education, acknowledging the fact that the study was based on a specific country and on a specific number of participants. However, as largely underlined in several moments throughout the entire thesis, the consideration of the peculiarities of the context is fundamental at the

moment of introducing a technology in a teaching-and-learning ecosystem. Therefore, the study hope to be a contribution to the research community by presenting a set of guidelines derived from the detailed study of teachers' needs, values and purposes *in action*, which are structured in the form of advices to support both MAR platforms designers, on the one hand, and those teachers who want to venture in the implementation of MAR for their Italian language classes. The guidelines are observable in Tables 12 and 13 below.

Table 12

Guidelines for teachers to incorporate MAR in their ILTAL practice

	Guidelines for teachers to incorporate MAR in their teaching ILTAL practice
a.	Carefully select the MAR platform according to two important factors: - the characteristics of the platform - the amount of time and the type of resources you have to learn to use it
b.	Think about working collaboratively with colleagues
c.	Make sure your students have the type of devices required to work with the platform you chose
d.	Think about having your students work in groups
e.	Think about moving out from the traditional classroom space
f.	Think about the possibility to have students generate contents as part of the design of the MAR activities
g.	Think about developing 'scavenger hunts type' of activities
h.	Try to use characters and contents which are close to students' realities (for example memes, bitmoji ecc.)
h.	Carefully consider how to avoid students' distractions not only during the implementations of the activities, but also while you are designing them

Table 13

Suggestions for MAR platform designers for language teaching

	Suggestions for MAR platform designers
a.	It is fundamental to consider teachers' time constraints
b.	It is important to provide educators with supporting material to shorten the learning curve (e.g. short tutorials)
c.	Provide multilingual instructions and learning material
d.	Allow teachers to upload their own contents easily (audio, video, text etc.)
e.	It is a good idea to make the platform more easy and accessible as possible, because teachers do not have time to learn how to code, for example (blocks which already contains codes are a good idea)
f.	Provide educators with the possibility to access to a shared database of contents
g.	Give teachers the possibility to work collaboratively on the design of the activities, also at distance
h.	Consider the accessibility issues, the platform should work perfectly with both Android and iOS devices
i.	If open-source, better!

7.3 Future directions of the study

A short premise is necessary in the context of this paragraph. Braun & Clarke (2022) advice researchers to not adopt the expression "limitations of the study" in RTA and in fully qualitative research, since it is considered as a reminiscence of a quantitative paradigm. On the contrary, they invite researchers to reflect on the journey they have undertaken and on the lessons they have learned during the travel, living advices to colleagues which may want to venture on a similar journey in the future. Therefore, these 'recommendations' (or limitations, according to the point of view) were scattered throughout the work when discussing decisions undertaken regarding a number of aspects of the research, while in this short paragraph the author of this thesis wants to share the possible directions which the journey could take in the future, according to her point of view.

The completion of this doctoral thesis does not determine the complete resolution of such a complex and context-dependent issue as the one faced in this research, but the author of the study hopes that it can support other researchers, teachers and learning designers to be able to attend to it on the basis of the transferability of its results. A multitude of new questions open up and the following are the possible future lines of action that can be considered more relevant:

- Research could benefit from the possibility to transfer the results to other contexts, by exploring the processes of implementing MAR through the support of the guidelines in a number of teaching-an-learning environments with their own peculiarities. Consequently, it would be possible to expand not simply the set of guidelines identified, but our overall knowledge on the process of contextualizing MAR tools for language learning.

- It could be useful to include students voices in the process, in order to achieve a wider picture of the phenomenon under observation. As explained in the methodology section of this work, students were not considered in the context of the current study because of time and resources constraints which the Covid-19 Pandemic and the collaboration among several institutions imposed.

- Long-term studies based on observation and on a strong involvement of researchers in specific contexts are needed, in order to avoid to generate results which are contingent to a limited span of time. As highlighted in the discussion section, for example, more insights on the improvement of teacher-students relation through the implementation of MAR could be obtained, expanding our knowledge of the possible positive consequences of such tools on the entire learning process.

- Studies on MAR implementation benefit from interdisciplinary teams, where the collaboration among learning designers, educators, teachers and students through Design-based research approaches, for example, may produce more insightful results and lead to the generation of design frameworks which can be adapted to the peculiarities of a number of contexts afterwards.

- More open-source authoring tools for language teachers based on the exploration of their actual needs in action are needed, in order to guarantee a more democratic access to new technologies, which should not be limited by economic, social or linguistic barriers.

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APPENDIXES

APPENDIX 1: ETHICAL APPROVAL

UNIVERSIDAD DE MURCIA | Vicerrectorado de Investigación

CEI Comisión de Ética de Investigación

CAMPUS MARE NOSTRUM

INFORME DE LA COMISIÓN DE ÉTICA DE INVESTIGACIÓN DE LA UNIVERSIDAD DE MURCIA

Jaime Peris Riera, Catedrático de Universidad y Secretario de la Comisión de Ética de Investigación de la Universidad de Murcia,

CERTIFICA:

Que Dª Martina Manna ha presentado la memoria de trabajo de la Tesis Doctoral titulada *"Percepción y uso de realidad aumentada para la enseñanza del italiano como idioma extranjero",* dirigida por Dª Isabel María Solano Fernández a la Comisión de Ética de Investigación de la Universidad de Murcia.

Que dicha Comisión analizó toda la documentación presentada, y de conformidad con lo acordado el día veinte de junio de dos mil veintidós[1], por unanimidad, se emite INFORME FAVORABLE, desde el punto de vista ético de la investigación.

Y para que conste y tenga los efectos que correspondan firmo esta certificación con el visto bueno de la Presidenta de la Comisión.

Vº Bº
LA PRESIDENTA DE LA COMISIÓN
DE ÉTICA DE INVESTIGACIÓN DE LA
UNIVERSIDAD DE MURCIA

Fdo.: María Senena Corbalán García

ID: 4071/2022

[1]A los efectos de lo establecido en el art. 19.5 de la Ley 40/2015 de 1 de octubre de Régimen Jurídico del Sector Público (B.O.E. 02-10), se advierte que el acta de la sesión citada está pendiente de aprobación

APPENDIX 2: INFORMATION SHEET FOR PARTICIPANTS

UNIVERSITÀ PER STRANIERI DI SIENA
&
UNIVERSIDAD DE MURCIA

HOJA DE INFORMACIÓN A LA PERSONA PARTICIPANTE:

Sobre el proyecto: *Teacher perceptions on implementing Mobile Augmented Reality for the Teaching of Italian as a Foreign Language*

TITULO DEL PROYECTO EN ESPAÑOL: *Percepción y uso de Realidad Aumentada para la enseñanza del italiano como idioma extranjero.*

TITULO DEL PROYECTO EN ITALIANO: *Percezioni e uso della Realtà Aumentata per l'insegnamento dell'italiano come lingua straniera.*

Estimada/ estimado docente,

Como parte de un estudio de investigación para la realización de una Tesis Doctoral en la Escuela de Doctorado en *Linguistica Storica, Linguistica Educativa e Italianistica. L'italiano, le altre lingue e culture* de la Universidad para Extranjeros de Siena (Italia), en colaboración con el Departamento de Educación de la Escuela Internacional de Doctorado de la Universidad de Murcia, queremos facilitarle información correcta y suficiente para que pueda juzgar y decidir si quiere participar en este estudio. Para ello le ruego lea esta hoja informativa con atención.

¿POR QUÉ LAS Y LOS INVITO A PARTICIPAR A ESTA INVESTIGACIÓN?

Porque usted es una profesora o un profesor que trabaja en una institución en la cual se imparte la lengua italiana como materia curricular en Argentina.

¿QUÉ NECESITA SABER?

- Más adelante en este documento se encontrará con información específica sobre la investigación. Así y todo, la investigadora también le brindará precisiones al respecto a través de encuentros virtuales por las plataformas Zoom o Google Meet.
- La participación es voluntaria.

- Puede participar ahora y cambiar de opinión más tarde.
- No dude en pedir todas las explicaciones necesarias antes de decidir.

¿CON QUIÉN PUEDE HABLAR DE ESTA INVESTIGACIÓN?

Si tiene preguntas o quejas puede hablar con la investigadora, MARTINA MANNA. Puede enviar sus peticiones y/o comentarios por los siguientes correos electrónicos:
m.manna@studenti.unistrasi.it
martina.manna@um.es
En el caso de que quisiera hablar con alguien distinto a la investigadora, de que la investigadora no responda a su preguntas o quejas o de que no pueda contactarse con ella, puede contactar las supervisoras del proyecto, la Profesora Carla Bagna y la Profesora Isabel M Solano Fernández, a los correo electrónicos:
bagna@unistrasi.it
imsolano@um.es

¿POR QUÉ ESTA INVESTIGACIÓN?

Las tecnologías emergentes (Realidad Aumentada y Virtual, Social Media, Inteligencias Artificiales ecc.) están ingresando en el mundo de la educación, así como en su tiempo lo hicieron tecnologías de audios en mp3, videos y otros suportes digitales a la didáctica.
Por lo tanto, hoy en día una investigación de las experiencias de las y los docentes al momento de introducir estas nuevas herramientas en el aula resulta necesaria, en cuanto permitiría profundizar de qué forma estas tecnologías pueden apoyar y favorecer los procesos de enseñanza y aprendizaje. Con su estudio, la investigadora quiere entonces por un lado favorecer la implementación de la Realidad Aumentada (RA) para la enseñanza del italiano como lengua extranjera en Argentina y, por el otro, conocer las necesidades y las problemáticas que las y los docentes pueden encontrar durante este proceso.

¿CUÁNTO DURARÁ LA PARTICIPACIÓN EN LA INVESTIGACIÓN?

El estudio se desarrolla en un arco de tres años. Sin embargo, el momento de colaboración con las y los docentes se llevará a cabo a partir de los meses de julio/agosto 2022 hasta los meses de septiembre/octubre del mismo año. En una primera fase se organizarán encuentros online, para que las y los docentes conozcan la plataforma a utilizarse y construyan actividades de RA, siempre con el apoyo de la investigadora. Las actividades diseñadas por las docentes serán, en un segundo momento, implementadas en el aula con el alumnado, preferiblemente de forma presencial y con la participación de la investigadora.

¿QUÉ PASA SI DICE QUE SÍ, QUE QUIERE ESTAR EN ESTA INVESTIGACIÓN?

La participación en el estudio consiste en tres formas de colaboración con la investigadora:

1. Realización e implementación de actividades de RA, que se ajusten a las necesidades de las y los docentes, del alumnado y a las exigencias del currículo y de los objetivos didácticos. Las actividades serán preparadas por las y los docentes con el apoyo de la investigadora, a través de una plataforma que la investigadora les presentará con encuentros online y tutoriales.

Se puede trabajar por separado o en parejas y se pueden diseñar actividades según las exigencias propias de cada docente, de cada clase y de los distintos objetivos didácticos.
Esta primera forma de colaboración se llevará a cabo principalmente de forma virtual, a través de encuentros online, que también se utilizaran para la recolección de información sobre exigencias y necesidades que las y los docentes pueden manifestar. Una vez que las y los docentes hayan preparado las actividades, se realizaran las implementaciones en el aula, de forma presencial y con la participación de la investigadora.

2. La segunda forma de colaboración consiste en la compilación de un breve cuestionario anónimo (2-3 minutos), que se entregará a principio del proyecto.

3. La tercera forma de colaboración consiste en la participación voluntarias en entrevistas conducidas por la investigadora en relación al trabajo desarrollado. Las entrevistas se pueden realizar en cualquier momento conveniente tanto para usted como para la investigadora.

¿QUÉ PASA SI NO QUIERE ESTAR EN ESTA INVESTIGACIÓN?
La participación en la investigación es voluntaria. Por lo tanto usted puede decidir no formar parte de ella.

¿QUÉ PASA SI DICE QUE SÍ, PERO LUEGO CAMBIA DE OPINIÓN?
Usted puede dejar de participar en la investigación en cualquier momento. Si decide dejar la investigación después de que haya compilado los cuestionarios y/o participado en las entrevistas, póngase en contacto con la investigadora para que pueda eliminar todos los datos que se hayan recogido hasta ese momento, así como el registro de su participación (formulario de consentimiento, cualquier comunicación con el equipo de investigación, etc.).

¿TIENE QUE PAGAR ALGO MIENTRAS ESTÁ EN ESTE ESTUDIO?
No hay costo para usted por participar en este estudio.

¿QUÉ HARÁ LA INVESTIGATORA CON LA INFORMACIÓN RECOGIDA?
Al final del estudio se utilizará la información para presentar los resultados. La información será completamente anónima. La eventual publicación de los resultados de la investigación se hará de modo que los datos personales sigan siendo confidenciales. Se protegerá la privacidad de los datos recogidos y se restringirá el acceso a la información a través de la inclusión de los datos en un fichero sometido a y con las garantías de la ley 15/1999 de 13 de diciembre de protección de datos personales.

En consecuencia, le solicitamos que firme y entregue la hoja de Declaración de Consentimiento Informado que se adjunta.

APPENDIX 3: CONSENT FORM

ATENEO INTERNAZIONALE
Università per Stranieri di Siena

UNIVERSIDAD DE MURCIA
FACULTAD DE EDUCACIÓN

DECLARACIÓN DE CONSENTIMIENTO INFORMADO

Por este medio, yo _____ manifiesto que he sido informado detalladamente en la *Hoja de Información a la Persona Participante* sobre lo que presupone la participación en el proyecto de investigación titulado "Percepción y uso de Realidad Aumentada para la enseñanza del italiano como idioma extranjero."

He sido informado de que mis datos personales serán protegidos e incluidos en un fichero que deberá estar sometido a y con las garantías de la Ley Orgánica 15/1999 de 13 de diciembre, de Protección de Datos de Carácter Personal.

He recibido los datos de contacto de la investigadora y de las directoras de tesis.

He sido informada/o de que puedo abandonar el estudio en cualquier momento sin dar explicaciones y sin que ello me suponga perjuicio alguno.

Tomando ello en consideración, DECLARO mi CONFORMIDAD para participar en el proyecto de investigación para favorecer la consecución de sus objetivos.

Mi correo electrónico es: _____
Mi número de teléfono: _____

Lugar y Fecha

_____

Firma

_____

APPENDIX 4: FOCUS GROUP GUIDING QUESTIONS

STEP 1: PRE-DESIGN
VIRTUAL FOCUS GROUP

Constructs	Questions
Anxiety and Comfort Perceived Ease of Use	1. What are your first impressions about AR? What do you think about this emergent ICT?
	2. Do you think it will be easy or not to learn how to design pedagogical activities with AR?
	3. How do you feel regarding this experience? Are you nervous? Are you enthusiastic?
	4. Do you think that learning how to use AR as an educational technology could improve teachers' skills and abilities? How?
	5. Have you ever received formal teacher training on new/emergent technologies at school?
	6. How does the infrastructure work in your schools? Do you think there will be problems of any kind?
Perceived Uselfuness	7. What do you think that could be the main advantages of implementing AR as an educational technology? And the downsides?
	8. To what extent could the implementation of AR as an educational technology have an impact on your students? How do you feel regarding this aspect?
	9. Regarding the fact that you are going to use the smartphone in classroom, do you think that it could be a useful experience and why?
	10. Something to add?

APPENDIX 5: ONLINE SURVEY ON TEACHERS' PROFESSIONAL PROFILES

Informazioni primo incontro

Cara / o insegnante,

Grazie per il tuo interesse nel mio progetto di ricerca!
Per il nostro incontro ti chiedo di fornirmi alcune informazioni che risultano particolarmente utili per la buona riuscita della ricerca.

Come giá specificato precedentemente, tutte le informazioni da te fornite saranno rese totalmente anonime e sará garantita la privacy durante tutto il processo di ricerca. Come puoi vedere, infatti, il modulo non registra il tuo indirizzo email.
Una volta completato non dimenticarti di inviarlo cliccando sul pulsante "invia".

Grazie di nuovo per la tua collaborazione e a presto!

Martina Manna

* Indica una domanda obbligatoria

1. Sei *

   Contrassegna solo un ovale.

   - ◯ uomo
   - ◯ donna
   - ◯ altro

2. Quanti anni hai? *

3. Da quanti anni insegni? *

Contrassegna solo un ovale.

- ◯ 0-1
- ◯ 2-5
- ◯ 6-10
- ◯ 11-15
- ◯ 15 anni o piú di 15

4. Conoscevi la Realtá Aumentata prima di partecipare in questo studio? *

Contrassegna solo un ovale.

- ◯ Si
- ◯ No

5. Hai mai utilizzato la Realtá Aumentata in classe prima di partecipare in questo studio? *

Contrassegna solo un ovale.

- ◯ Si
- ◯ No

6. Conosci altre tecnologie emergenti? Se sí, quali? *

_____

7. Hai mai utilizzato altre tecnologie emergenti in classe? Se sí, quali? *

_____

Grazie!

APPENDIX 6: FIRST INDIVIDUAL SEMI-STRUCTURED INTERVIEWS GUIDING QUESTIONS (DESIGN STEP)

STEP 2: DESIGN
VIRTUAL INDIVIDUAL SEMI-STRUCTURED INTERVIEWS

Constructs	Questions
Anxiety and Comfort	1. How is the experience with the Metaverse going? Are you nervous? Are you frustrated?
Task Technology Fit	2. What kind of activities are you working on?
	3. Was it easy to take decisions regarding how to use the Metaverse in relation to the teaching and learning objectives of your course?
Perceived Ease of Use	4. Overall, is it resulting easy or difficult for you to learn how to use the Metaverse?
	5. Which are, if there are any, the main difficulties for you in learning how to design MAR activities with the Metaverse?
	6. Would you change, improve something of the Metaverse?
External Agents	7. Where the tutorial useful for you?
	8. In addition to the tutorials, would have been useful for you to receive any other kind of support?
	10. Something to add?

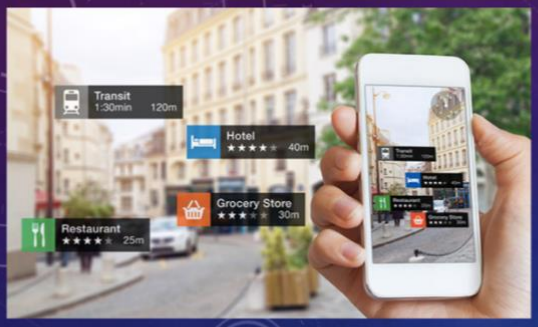
APPENDIX 7: SECOND INDIVIDUAL SEMI-STRUCTURED INTERVIEWS GUIDING QUESTIONS (POST-IMPLEMENTATION STEP)

STEP 4: POST-IMPLEMENTATION
VIRTUAL INDIVIDUAL SEMI-STRUCTURED INTERVIEW

Constructs	Questions
Perceived Usefulness	1. How did it go?
	2. How did you see your students? Were they motivated?
	3. After implementing it, what are, according to you, advantages and disadvantages of the implementation of AR as an educational technology?
	4. What were the consequences of using the smartphone in classroom?
	5. Overall, would you say that MAR is a useful tool for the ILTAL?
	6. Would you use the App again in the future?
	7. Would you implement the App for the same kind of pedagogical activities you did during our experience together or would you change something?
	8. Would you include AR as a regular educational technology in your instructional practice?
External Agents	9. Did the App work or did you experience any kind of technical problem?
	10. Was it complicated to organize students in order to do the activities? Why?
	11. Do you want to say or add something to our conversation?

APPENDIX 8: POWER POINT SLIDES IMPLEMENTED DURING THE FIRST ONLINE FOCUS GROUPS TO PRESENT THE OVERALL STUDY AND THE METAVERSE PLATFORM

ESEMPI DI REALTÀ AUMENTATA NEL QUOTIDIANO



ESEMPI DI REALTÀ AUMENTATA A SCUOLA

PERCHÉ UNO STUDIO SULLA RA A SCUOLA?

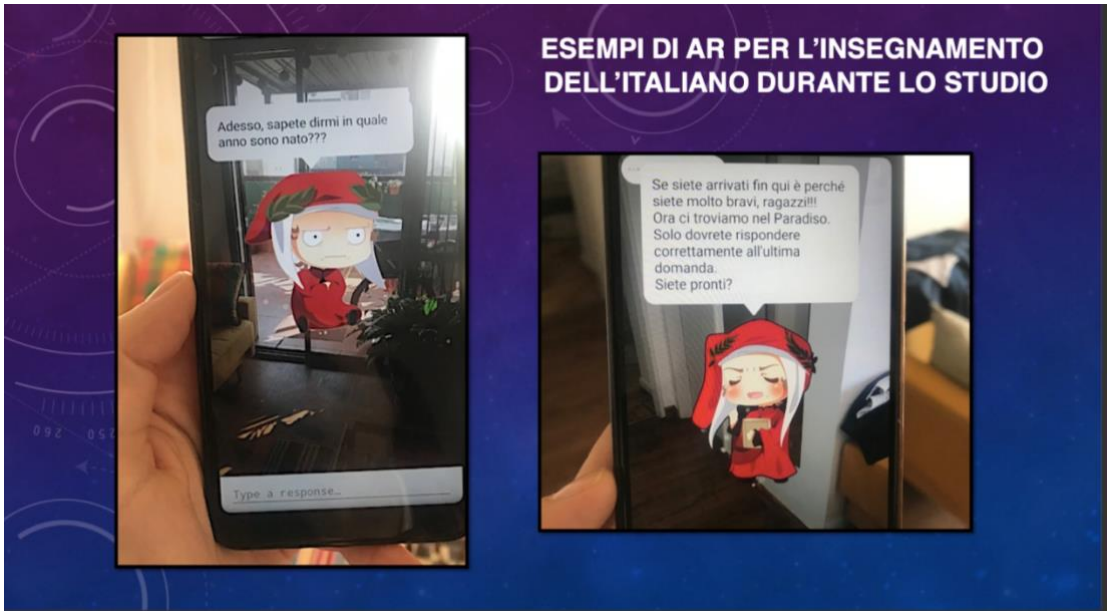
TIPICA ATTITUDINE DI STUDENTI
E STUDENTESSE....

CONSEGUENTE
DISPERAZIONE
DELLE/DEI
DOCENTI

APPRENDIMENTO RISULTANTE (?)

- AUMENTA LA MOTIVAZIONE
- FAVORISCE LA MEMORIZZAZIONE DEI CONTENUTI
- HA RICADUTE POSITIVE SULL'APPRENDIMENTO

- E LE/I DOCENTI??


ESEMPI DI AR PER L'INSEGNAMENTO DELL'ITALIANO DURANTE LO STUDIO
Adesso, sapete dirmi in quale anno sono nato???
Type a response...
Se siete arrivati fin qui è perché siete molto bravi, ragazzi!!! Ora ci troviamo nel Paradiso. Solo dovrete rispondere correttamente all'ultima domanda. Siete pronti?


MA FORSE SARÀ PIÙ FACILE CON UN ESEMPIO PRATICO...
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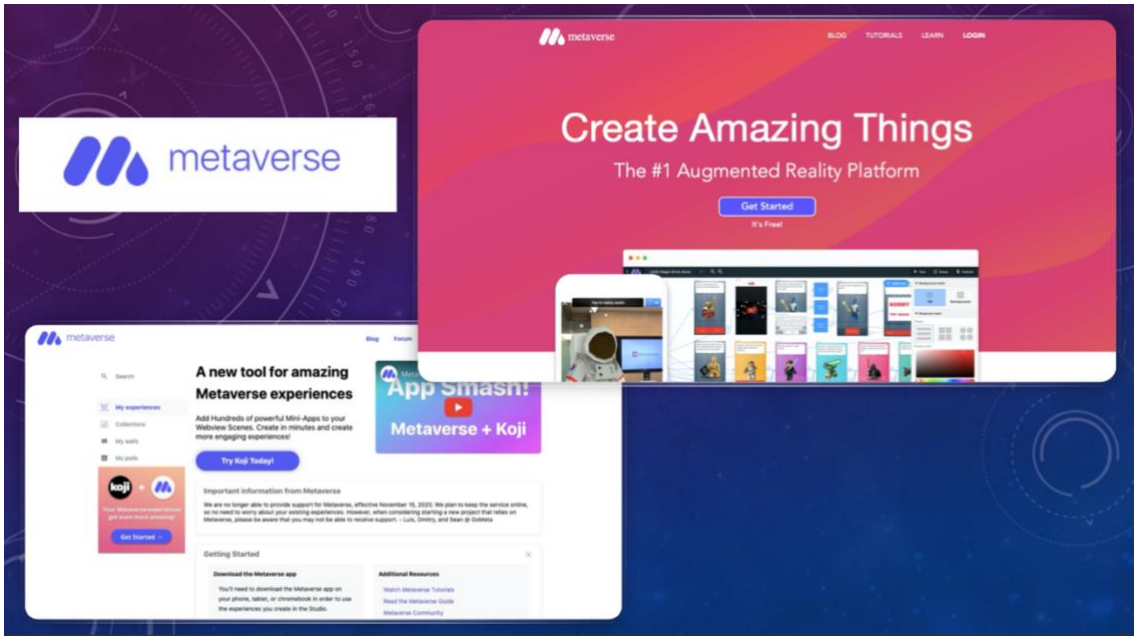
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BLOG
TUTORIALS
LEARN
LOGIN
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A new tool for amazing
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Important information from Metaverse
Getting Started


METAVERSE STUDIO
Add new


GRAZIE! GRACIAS! SHUKRAN!
DANKE! MERCI! THANK YOU!