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The City as a Gamified Learning Environment: Designing and Testing a Prototype for Art and Cultural Studies Students

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Abstract

Art and Cultural Studies lecturers often find traditional classroom settings challenging in fostering engaging and immersive learning experiences. Outdoor learning and exploration of physical surroundings present an opportunity to enhance students' curiosity and engagement in learning activities. Several studies suggest that cities offer vast, untapped potential as learning environments, providing dynamic and experiential spaces for students to explore and connect with Art, Culture, and historical narratives. However, there is a gap in the literature regarding studies on integrating gamified digital tools into the curriculum.

This dissertation researches the effectiveness of gamified location-based mobile applications as learning tools for BA students in Visual Art and Cultural Studies through in-depth interviews with educators from practical and theoretical courses related to various forms of Art. Findings from the first course of interviews informed the development of a quest-like educational mobile application prototype, which was, in turn, tested to assess students' perceptions of the prototype's quality alongside enhancement of the learning process and engagement.

The testing confirmed the potential use of location-based mobile applications for educational purposes. Both educators and students reported high engagement, active learning, interaction with a city and overall satisfaction, suggesting further improvements in multimedia performance and accessibility features. Half of the educators who participated in the research expressed interest in collaborating for future development and integrating the application into their practical and theoretical courses for outside classes.

keywords: learning environment, outdoor learning, gamification, transformative learning

Table of Contents

<u>1. Introduction</u>	3
<u>1.1 Context and Motivation</u>	3
<u>1.2 Research Objectives</u>	3
<u>1.3 Project</u>	4
<u>1.4 Structure of the Dissertation</u>	4
<u>2. State of the Art</u>	5
<u>2.1 Introduction</u>	5
<u>2.2 Theoretical Framework</u>	5
<u>2.2.1 Gamification</u>	5
<u>2.2.2 Learning Environment</u>	7
<u>2.2.3 Outdoor Learning</u>	8
<u>2.2.4 Transformative Learning Theory</u>	9
<u>2.3 Transformative Learning of Art and Culture</u>	10
<u>2.3.1 History and Critics of Transformative Learning</u>	10
<u>2.3.2 Transformative Nature of Art-based Educational Practices</u>	13
<u>2.3.3 Conclusion</u>	14
<u>2.4 Gamification in Visual Art and Cultural Studies</u>	14
<u>2.4.1 Gamified Visual Art Studies</u>	15
<u>2.4.2 Gamified Cultural Heritage Learning</u>	18
<u>2.4.3 Conclusion</u>	23
<u>2.5 The City as a Gamified Learning Environment</u>	23
<u>2.5.1 City as a Learning Environment</u>	23
<u>2.5.2 Gamified Location-based Learning</u>	25
<u>2.6 Conclusion</u>	32
<u>3. Research Methodology</u>	33
<u>3.1 Introduction</u>	33

<u>3.2 Research Design</u>	33
<u>3.3 Participants Selection</u>	34
<u>3.4 Data Collection Methods</u>	35
<u>3.5 Data Analysis</u>	37
<u>3.6 Ethical Considerations</u>	38
<u>3.7 Challenges and Limitations</u>	39
<u>4. Prototype</u>	41
<u>4.1 The Mock-ups for the Interviews</u>	41
<u>4.2 Designing Interactive Prototype</u>	44
<u>4.3 Improvement</u>	49
<u>5. Results</u>	55
<u>5.1 Introduction</u>	55
<u>5.2 The Awareness and Accessibility of New Teaching Methods, Gamified Learning, Digital Tools and Software for Learning Purposes</u>	56
<u>5.3 Outdoor learning, field trips and interaction with a city for engaging education</u>	62
<u>5.4 Engagement, Critical Thinking, Context and Communication in Theoretical and Practical Classes</u>	67
<u>5.5 Visual Tools for Transformative Learning</u>	72
<u>5.6 Conclusion</u>	75
<u>6. Conclusion and Future Work</u>	76
<u>Bibliography</u>	78
<u>Appendix A Interfaces of mock-ups and the final prototype</u>	90
<u>Appendix B Link to the final interactive prototype</u>	92
<u>Appendix C User Journey</u>	93

1. Introduction

1.1 Context and Motivation

In the realm of art and cultural studies education, traditional classroom settings often encounter limitations when it comes to creating engaging and immersive learning experiences (Wang & Lv, 2018). The classroom's inherent structure, which emphasises lectures, seminars, and assignments, may inhibit students' curiosity and active engagement with the subject matter. *Outdoor learning* is one of the ways to explore students' surroundings and open the door to more engaging learning environments. According to a few studies, cities can offer generous and untapped potential as gamified learning environments, providing dynamic and experiential space for students to explore and connect with art, culture, and historical narratives (Gordillo et al., 2013)

This work was based on the belief that studying new teaching methods and settings for Art and Culture Studies in the frame of a formal university education system can transform the learning process and bring new technologies to students' and educators' benefit. *Gamification*, which refers to using game mechanics in non-gaming contexts (Deterding et al., 2011) or creating *gameful* experiences (Hamari et al., 2014), is a crucial aspect of innovative educational design. It has gained popularity in various sectors as it offers an innovative and effective way to engage and motivate individuals (Caponetto et al., 2014; Kapp, 2012). The field of education is no exception and has also embraced *gamified learning* (Domínguez et al., 2013).

The primary motivation for this study is to research how the combination of new educational methods, location-based digital technologies and interactive activities for playful learning can transform urban landscapes into an interactive learning playground where students can collect information, collaborate, and solve puzzles related to art, architecture, historical events, and contemporary cultural phenomena by utilising the city as a gamified *learning environment*. This field is still emerging and offers limited studies that allow this work to build the basis for innovative educational digital tools.

1.2 Research Objectives

This research aims to study how gamified location-based mobile applications can serve as effective learning tools for BA students in Visual Art and Cultural Studies. Moreover, the study focuses on the level of engagement and learning process in different learning environments.

1.3 Project

The essential part of this study is designing and developing the prototype of an educational mobile application that will enhance engagement and transform students' and educators' visions of digital

tools that can bring another perspective to Art and Cultural Studies. The application is a tool for a quest-like educational walk that combines theoretical learning materials and practical activities, such as tasks or interactions, allowing students to see the world through different lenses.

1.4 Structure of the Dissertation

The study is divided into six main chapters. Chapter Two, the State of the Art, follows this introduction. That chapter covers themes of gamification, learning environments, transformative learning, and, finally, the city as a gamified learning environment.

Chapter Three is related to the detailed description of this inquiry's methodology, focusing on research design, participants' selection, data collection and analysis methods, ethical differences, and limitations. Chapter Four then introduces the prototype development process, from mockups to the final improved version.

Chapter Five presents the study's results and is divided into four sections: the awareness and accessibility of new teaching methods, gamified learning, digital tools, and software for learning purposes; outdoor learning, field trips, and interaction with a city for engaging education; engagement, critical thinking, context, and communication in theoretical and practical classes; and visual tools and use of senses for transformative learning. Chapter Six then concludes this dissertation, with a reflection on results and possible future development.

2. State of the Art

2.1 Introduction

This literature review chapter will delve into the intersections of art and cultural education with gamified *location-based learning*, into *transformative learning* theory (Mezirow, 1991; Howie & Bagnall, 2013; Christie et al., 2015), into empirical research and practical applications on visual art (Han, 2015), alongside cultural heritage studies (Angelopoulou et al., 2012; O'Connor et al., 2020; Klefodimos et al., 2023). It will examine how gamified cityscapes and educational outdoor activities can enhance students' understanding of art forms, historical contexts, and cultural expressions, fostering critical thinking, creative expression, and the collaborative nature of learning (Dahlgren & Szczepanski, 2012). The review will also highlight the potential challenges and considerations in implementing gamified tools in art and cultural studies curricula, emphasising the importance of balancing game elements with pedagogical goals and aligning the gamified experience with the specific learning objectives of the course.

Throughout the review, we will explore the transformative capability of gamified cityscapes, which demonstrates how this approach can transform the urban environment into a dynamic learning laboratory where students become active participants in their education and develop a deeper appreciation for the interconnectedness of art, culture, and the urban landscape.

2.2 Theoretical Framework

This section will explore various definitions of gamification, learning environment, outdoor learning, and transformative learning theory. It will delve into the concept of gamified learning and its potential to enhance engagement and motivation within a learning environment. Furthermore, the section will discuss transformative learning theory, which emphasises learners' experiences and environmental influences, leading to the transformation of their perspectives. A body of theoretical literature has been analysed for each concept to find the most suitable definitions for this research.

2.2.1 Gamification

Games have become an integral part of our culture, impacting our social and leisure activities in ways that were historically expected but on an unprecedented scale (Deterding, 2012). The concept of *gamification*, a term from the game design industry, has been recognised as more than an approach that merely brings decorative elements and simple mechanics such as badges and leaderboards onto other contexts (Entis, 2011). Scholars have been paying attention to the mechanics of games that can enhance engagement and motivation (Villagrasa & Duran, 2013). Gamification is used in various

fields such as marketing (Sever et al., 2015), management (Wanick & Bui, 2019), tourism (Werbach & Hunter, 2012), sustainability (Seaborn & Fels, 2015), software engineering (Pedreira et al., 2015) and education (Wang & Lv, 2018). Examples of gamification include points cards, scholastic levels, and reward memberships (Caponetto et al., 2014).

Most literature indeed defines gamification as the intentional use of game mechanics in non-gaming contexts (Deterding et al., 2011; Kapp, 2012). According to Deterding (2012), gamification means integrating game components into an interactive system without creating a complete game. This involves applying aspects of "gamefulness, gameful interaction, and gameful design" with a specific purpose in mind (Deterding et al., 2011). Another view on gamification refers to the experience and psychological impacts that games provide. Gamification refers to the process of enhancing services with motivational affordances to invoke *gameful* experiences and further behavioural outcomes (Hamari et al., 2012).

Gamification in the business field mainly refers to the use of game elements and game-design techniques, viewing it as a tool for business strategy. It involves designing products, services, and systems as a game designer would do (Werbach & Hunter, 2012). Gamification in the context of software engineering serves to improve user engagement, motivation, and performance in tasks (Pedreira et al., 2015). In marketing, game mechanics are utilised to drive engagement, loyalty, and brand awareness in advertising activities. It has been recognised as an effective tool for boosting virality and increasing revenue (Sever et al., 2015).

Researchers often found engagement and motivation to be the main benefits of gamification, especially in educational contexts. The use of game-based learning principles like challenge, interactivity, and feedback can enhance the learning process and knowledge retention (Kiryakova, 2014). Huang and Soman (2013) suggest that gamification should not be directly associated with obtaining knowledge and skills and can rather be viewed as a tool to improve students' commitment and motivation to gain said knowledge and skills. Enhancement of motivation and engagement in learning tasks is the main driver for adopting gamification techniques (Caponetto et al., 2014). Gamification supports learning in various educational contexts and subject areas and addresses transversal attitudes and behaviours such as collaboration, creativity, and self-guided study (Wang & Lv, 2018).

Gamification, *gamified learning*, and *game-based learning* are often used interchangeably, although there are differences in their meanings and sometimes contradictory definitions. Some scholars refer to *game-based learning* as a game application specifically designed for educational purposes. It includes teaching objectives, methods, and quests to help learners achieve specific learning outcomes through meaningful and engaging tasks, whether digital or non-digital (Wang & Lv, 2018; Shohel et al., 2022). Other authors, such as Becker (2021), define *game-based learning* as an approach to learning rather than for developing a game. The author distinguishes the intentional development of *games for learning* (G4L) from *game-based learning* (GBL), which refers to reusing

existing games in the educational context. Hence, the focus is on the learning process, and games serve as a practice for improving the learning process and its effectiveness. Conversely, *gamification* and *gamified learning* refer to using game-based mechanics, aesthetics, and thinking to engage learners, promote learning, and solve problems (Huang & Soman, 2013). While some authors regard *serious games* – where educational content is transformed into a game – as a subset of gamification (Kapp, 2012), others regard *serious games* as a superset of *games for learning* (Becker, 2021).

2.2.2 Learning Environment

The learning process cannot be isolated from the environment where it occurs, and the era of digitalisation has provided educational institutions with new forms of *learning environments*, opening discussions about definitions and principles of the concept.

Although considerable attention has been given to learning environments in academic literature (Wilson, 1995; Moore et al., 2011; Moffat & McKim, 2015; Zamani et al., 2022), it is essential to note that there is no universally accepted definition of a *learning environment*, and scholars even claim it to be ill-defined (Wilson, 1995). While some scholars refer to the learning environment as physical surroundings and structures that can be utilised as active tools for education and learning across various subjects (Taylor, 1993), others have argued that the learning environment is a broader and more useful concept for educators and researchers than the classroom (Moore et al., 2011). It is not merely the location of learning but the set of conditions in which knowledge and learning are possible (Brown, 2008). There is also a suggestion to define a learning environment as dialogue instead of seeking alternatives to classrooms and existing educational practices (Tella & Mononen-Aaltonen, 1998). The broader characterisation of the learning environment directs to everything that happens in the educational institute, including elements that encourage students' engagement and impact their academic achievement (Zamani et al., 2022).

According to Moore et al. (2011), learning environments encompass tools, delivery methods, and design methodologies. They can be self-paced, self-directed, or instructor-led, including courses, programs, and learning objects. The design of various learning environments depends on the learning objectives, target audience, physical or virtual access, and content type (Moore et al., 2011).

Technology integration into the academic sphere has led to the emergence of a new term - the *digital learning environment* (DLE). As a concept, DLE lacks a precise definition and is related to the context of its application. According to Sirkemaa (2003), the digital learning environment refers to a platform for education that leverages information technology. This kind of environment integrates technology into the learning process, highlights the importance of information technology, and serves as a medium for exchanging feedback and ideas. In addition, it acts as a mentor and motivator for students. Digital learning environments can be categorised as educational software, digital learning tools, online study programs, or learning resources (Suhonen & Sutinen, 2006). However, they can

also be technologies, resources, platforms, and systems that were not initially created for educational purposes but are now being utilised for teaching and learning purposes (Veletsianos, 2016). This means that DLE can encompass a wide range of digital tools and resources that facilitate education and learning activities.

It should be noted that, within educational institutions, digital learning environments are often referred to as *virtual learning environments* (VLE). A VLE is an integrated platform that enables students to apply for admission, enrol in courses, access complete course materials, take tests, and interact with professors and classmates online (Kumar et al., n.d.). The VLE provides tools for administrators, professors, and students to perform their duties effectively and supports the goals of a virtual university (O'Leary & Ramsden, 2002). VLEs are also known as Course Management Systems (CMS) and Learning Management Systems (LMS). The most common examples of software considered VLEs are Moodle and Blackboard.

A relatively recent addition to the academic landscape is the emergence of a new concept of the *modern learning environment* that has been circulating among different research studies related to the digital learning environment (Keppel et al., 2011; Sirkemaa & Varpelaide, 2018; Spivakovsky et al., 2019). The modern learning environment, as described by Keppell, Souter and Riddle in 2011, encompasses a range of physical and virtual spaces that facilitate both formal and informal learning. This includes blended, mobile, personal, and professional learning spaces designed to be flexible, adaptable, and conducive to independent and peer-based learning. According to Sirkemaa and Varpelaide (2018), the term modern learning environment refers to the combination of learning environments, platforms, technologies, and systems used for educational purposes in various learning situations.

2.2.3 Outdoor Learning

With the rapid emergence of different approaches to modern education and the utilisation of various learning environments, outdoor learning has gained considerable attention in the academic literature (Eaton, 1998; Beames et al., 2012; Thomas & Munge, 2017). Various terms are used interchangeably to describe educational outdoor activities, including field trips, outdoor learning, outdoor education, out-of-school learning, and out-of-classroom learning.

The common thread among various definitions of outdoor learning refers to it as a pedagogical approach that takes place outside the traditional classroom setting and involves activities such as field trips, nature walks, and outdoor experiments (Fägerstam, 2012; Abdullah et al., 2021). The aim is to provide students with hands-on learning experiences in natural environments and foster a deeper connection with nature (Cosgriff, 2011). These experiences can enhance creativity, problem-solving skills (Hindmarsh & Hunt, 2020), physical health (Mann et al., 2021), and environmental awareness (Lugg, 2007). By immersing students in real-world contexts, outdoor learning offers a unique and holistic approach to education.

Another view suggests that outdoor learning is "an environment-focused educational approach characterised by action-centred and thematic learning processes frequently involving outdoor activities", as seen in Dahlgren & Szczepanski (1998). According to these authors, outdoor learning encourages knowledge and skill acquisition through interactions between emotions, actions, and thoughts during observation.

A slightly different perspective on outdoor education is that of Maheeran and colleagues (2017), which refers to utilising the campus environment, including open spaces and natural features, to create informal outdoor learning environments and classrooms in tertiary institutions. Due to the inconvenience and discomfort of outdoor surroundings on the campus, students have minimal opportunities to study outside the classroom. These scholars address the potential benefits of campus outdoor learning spaces for students' learning performances and the lack of emphasis on the importance of outdoor classrooms due to traditional instructional methods in classroom settings (Maheeran et al., 2017).

2.2.4 Transformative Learning Theory

Transformative learning theory, proposed by Mezirow and Marsick in 1978, emphasises the importance of critical reflection and the role of experience in adult learning (Fleischer, 2006; Mezirow, 2018; Howie & Bagnall, 2013). This type of learning can involve a simple shift in belief or a radical transformation of one's perspective (Foote, 2015). The theory is particularly relevant in higher education settings, where it can be used to foster a more holistic approach to learning (Enkhtur & Yamamoto, 2017; Papastamatis & Panitsides, 2014) and through active learning pedagogy (Landry-Meyer et al., 2019). It has also been applied in fields as diverse as theology (Fleischer, 2006), sustainability (Schnitzler, 2019), engineering (Elliott et al., 2023) and art (Chien & Yang, 2019).

Transformative learning theory envisions a person engaging in activities that create a disorienting dilemma, leading to a shift in their meaning schemas or perspectives. This shift can be fast or slow and can occur in the instrumental or communicative domain of learning (Mezirow, 1991). The individual seeks to make sense of their experiences by engaging in critical reflection and rational discourse with other adults (Howie & Bagnall, 2013).

Mezirow's theory has had a profound impact on academia, particularly in the field of adult education. This impact can be measured by the significant number of master's and doctoral students who have used Mezirow's theory as the foundation for their dissertations (Christie et al., 2015).



The next section introduces transformative learning, its complexity, critics, and practical applications in art and cultural studies.

2.3 Transformative Learning of Art and Culture

This section is focused on examining critical reviews of transformative learning theory throughout its existence and exploring the possibility of bringing the theory into practical experiments of art-based education. Transformative learning is a widespread approach to education among academics. Its broad theoretical basis allows for an in-depth analysis of the topic. In February 2024, I conducted a search in the Scopus database for "transformative learning," with a filter for papers containing the keyword "transformative learning", which returned more than 1,540 articles. Of these papers, 23 were selected based on their citation count and relevance to provide an overview of the theory. Additionally, 28 papers were selected by applying a filter for the Art and Humanities field and were studied to find practical applications for transformative learning in these fields.

2.3.1 History and Critics of Transformative Learning

Throughout the years, Mezirow's theory has faced several challenges and criticisms. One critical review, which analysed 39 dissertations on transformative learning conducted in North America, was published by Edward Taylor in 1997. In his article, *Building upon the theoretical debate: A critical review of the empirical studies of Mezirow's transformative learning theory*, Taylor concluded that while the studies showcased the importance of critical reflection in transformative learning, there was a need to better understand and account for the influence of context. According to Mezirow's (1997) theory, there are three types of reflection: content, process, and premise. In content reflection, learners are asked to examine the 'what' or content of the problem. In process reflection, learners examine the 'how' or the problem-solving strategies. In premise reflection, learners examine the 'why' or the long-held underlying beliefs and assumptions (Taylor, 2010; Bhukhanwala et al., 2016). Transformative learning values reflection not only due to the learner-centred structure of the theory but also because discussion among students and teachers opens new perspectives on previously established beliefs (Chien & Yang, 2019).

Additionally, Taylor (1997) emphasised the importance of including other ways of knowing beyond critical reflection, as well as of addressing diversity regarding class, ethnicity, gender, and sexual orientation, which later came into focus in many studies on transformative learning practices (Butterwick & Lawrence, 2010; Bhukhanwala et al., 2016; English&Davidson, 2022; Taimur et al., 2022). Despite Taylor's (1997) criticisms, scholars continue to focus on reflection as one of the main driving forces for transformative learning, especially in the practical domain (Bhukhanwala et al., 2016; Chien & Yang, 2019).

A few years before Taylor's review, Collard and Law (1989) had argued that Mezirow failed to emphasise the significance of collective social action as a goal of the transformative learning process. Mezirow acknowledged that mediating factors can impede collective social action due to a

transformed viewpoint (Christie et al., 2015). He further defended his theory by highlighting the difficulty in categorising the various forms that learning transformations and social action can take (Mezirow, 1989).

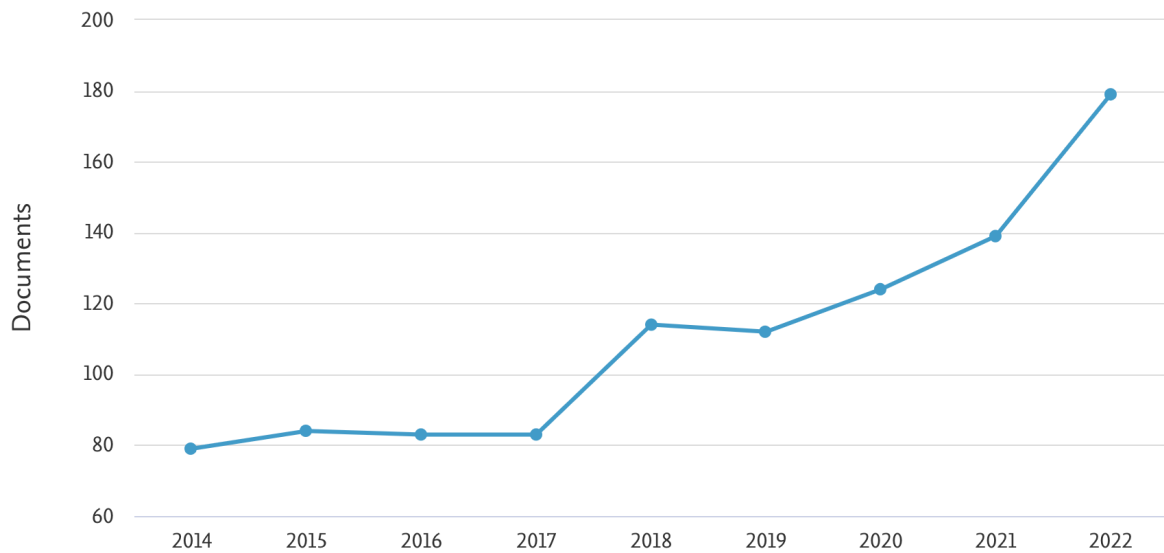
Another criticism insisted that Mezirow's theory did not recognise the socially constructed nature of development, including developmental stages in adult life (Tennant, 1993). Later, Newman's (2010) critical review of Mezirow's theory will explore neglecting the constructive nature of learning. Scholars also argued that Mezirow's theory emphasised cognition and neglected other ways of knowing, such as affective, somatic, intuitive, and spiritual (Christie et al., 2015).

Howie and Bagnall drew attention to transformative education again in 2013 with their publication of their review *A Beautiful Metaphor: Transformative Learning Theory*. The authors discuss the critiques of transformative learning theory, asserting that it still poses conceptual problems and is often overlooked as a topic worthy of critical discussion. Howie and Bagnall (2013) propose that the theory can be best understood as a metaphorical concept, which explains its continued popularity among educators despite its many inconsistencies. Their critical assumptions perfectly aligned with Michael Newman's (2010) speculation about the existence of transformative learning only in the realm of theory due to the nature of the learning process – generally supposed to be transformative and changing learners' beliefs.

In the meantime, in 2007, Taylor returned to his initial review and analysed 40 peer-reviewed journal articles. He concluded that transformative learning had been extensively researched and discussed in adult education for over 25 years. Taylor's claim still holds today, as evidenced by the significant interest in transformative learning that spiked in 2022 when more than 188 papers were published (Figure 1).

Figure 1

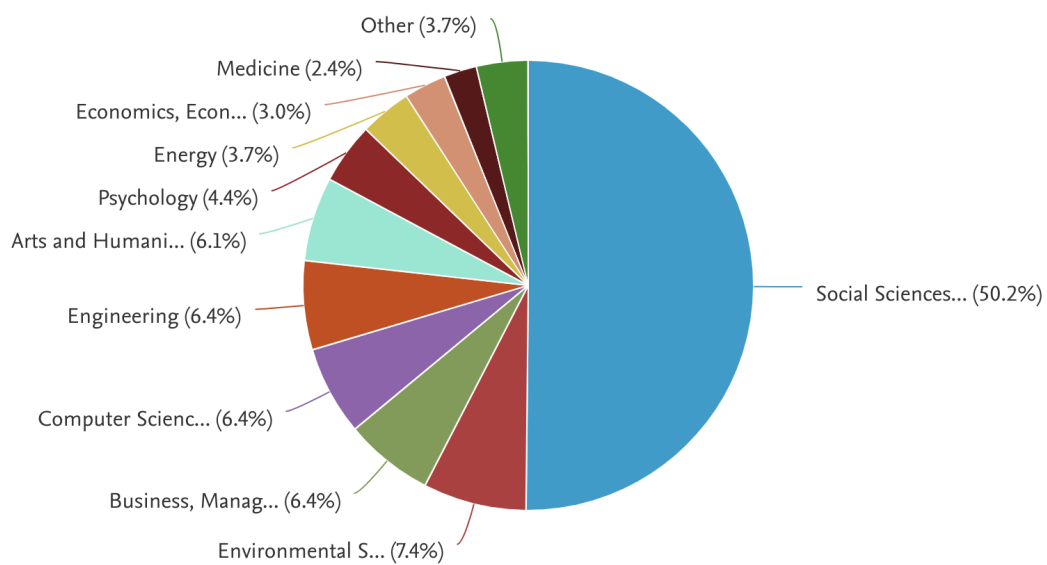
Published papers on Transformative Learning from the Scopus database (2024)



A search of transformative learning publications using the Scopus database indicates that social science is the most popular field for publications (Figure 2).

Figure 2

Published papers on Transformative Learning from the Scopus database by subject areas (2024)



In 2022, *sustainable education* and *transformative learning in the context of sustainability* have been widely discussed topics in publications. At least 27 papers from the Scopus database of 188 papers are related to sustainability. Also, several research studies have addressed the connections between digital learning and online and remote education (Graham et al., 2022; Piangiamore & Maramai, 2022; Taimur et al., 2022).

In summary, Mezirow's theory of transformative learning has significantly shaped the field of adult education. While it has faced criticisms regarding the understanding of context, the inclusion of diverse perspectives, and the recognition of various ways of knowing, the theory remains a focal point of research and discussion in the education field.

2.3.2 Transformative Nature of Art-based Educational Practices

Art is a powerful tool for transformation (Chien & Yang, 2019) and addressing social and cultural challenges (Raman et al., 2022). Multiple studies (cf. Butterwick & Lawrence, 2010; Chien & Yang, 2019) found that creating and learning about art brings students a new understanding of meanings and changes in perspectives. Brigham (2011) showed that creating art opens possibilities to transcend language limitations and promotes transformative learning through empathy, imagination, critical reflection, and dialogic relationships. Chien and Yang (2019) integrated art making as a means of understanding and aimed to go beyond what was already known. That vision perfectly connects to the transformative learning theory that lies in building new perceptions through the action of learning.

Still, the application of transformative learning theory in the domain of art and humanities does not attract much attention from academics and still lacks a defined path that can be useful for art educators. Nonetheless, there are several studies relating to specific fields of art education, such as drama practices (Moffat & McKim, 2015), arts-based duoethnography (Chien & Yang, 2019), community music education (English & Davidson, 2022), computer-assisted literature classes (Jamieson et al., 1996), design thinking pedagogy (Taimur et al., 2022).

Most of the studies on art-based educational practices emphasise the necessity of reflection and communication that creates the foundation for transformative learning. Learners' worlds change not merely through creating art but also through the dialogue between students and educators (Bhukhanwala et al., 2016). According to English and Davidson (2022), to recognise new meanings, students have to go through the process of listening, dialogue, and reflection, which are also common steps for effective learning (Newman, 2010). Additionally, English and Davidson argue that the connection of emotions and the creative process is the main force of transformative learning. According to the authors' studies on community music education, students tend to go through personal growth and learning linked to some emotional response (English & Davidson, 2022).

Another standpoint on the transformative nature of art-based education focuses on changes in the learning environment that lead to new educational experiences and obtaining different knowledge.

According to Moffat and McKim (2015), familiar classrooms are associated with traditional expectations from a studying process: "to sit in a seat facing the front of the room, to listen to the teacher standing at the front of the room, to take notes, to ask the occasional question and to voice the occasional opinion". Authors assumed that changing that established paradigm can enhance learning and motivate students to view the subject differently. Students were expected to analyse texts from various perspectives and integrate them into a broad critical discussion at the New Place Theatre, a unique learning environment. Changing places helped educators transform the learning process and improve students' active participation, new interpretations and class dynamics. It is worth mentioning that Moffat and McKim noted that the change in the learning environment works only in tandem with changing the structure of the classes and learning mechanisms.

Lastly, scholars connect transformative learning with embodied practices. Bhukhanwala (2016) considers not only emotions but also tacit knowledge that already exists in students' minds as dormant subconscious information (Butterwick & Lawrence, 2009). To gain this knowledge, learners must go through the restructuring process using various learning strategies. In 2009, Butterwick and Lawrence advocated for using arts-based approaches such as drawing visual metaphors, participating in theatre games, writing poems, and taking photographs to encourage transformative learning and facilitate the creation and performance of dialogues.

2.3.3. Conclusion

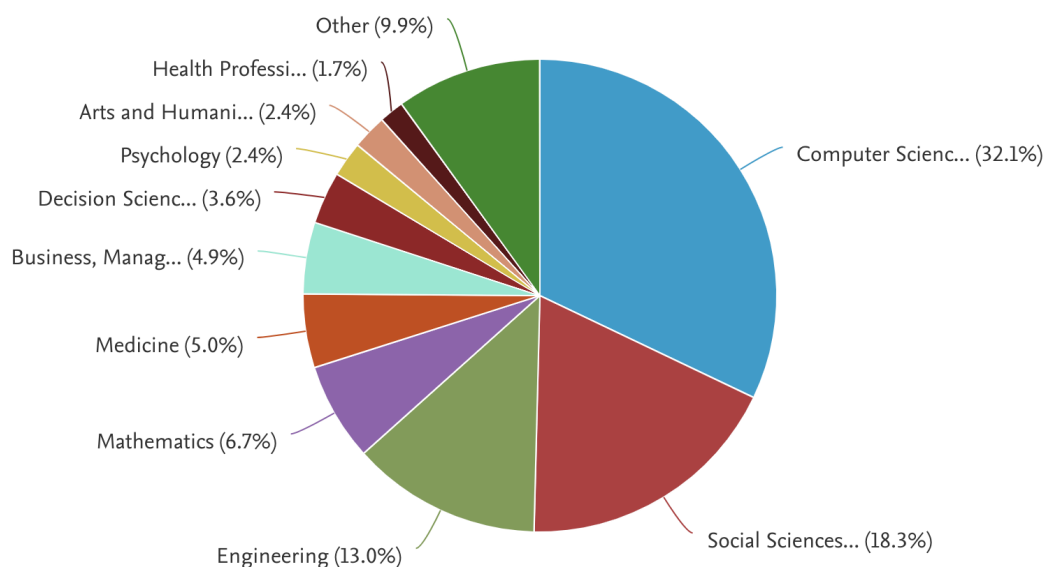
Through the creation and study of art, individuals can gain new perspectives and understanding, encourage empathetic behaviour, and engage in critical reflection, ultimately leading to the transformation of a learner's world. Though studies have emphasised the significance of various factors – including reflection, communication, emotional connection, and changes in the learning environment – that contribute to transformative learning within art-based education, we concluded that the field has yet to bring new practical and theoretical approaches to art and cultural education.~

2.4 Gamification in Visual Art and Cultural Studies

This section explores the implementation of gamification methods in art and cultural studies. It provides examples of experimental research from educators and the utilisation of digital tools for cultural heritage courses. In February 2024, Scopus contained 14,846 documents on "gamification". However, only 680 of these papers were categorised under the field of Arts and Humanities (Figure 3).

Figure 3

Published papers on Gamification from Scopus database by subject area (2024)



I reviewed more than 20 papers in our analysis, focusing on incorporating technologies, educational goals, and future perspectives.

2.4.1 Gamified Visual Art Studies

Art education tends to stand solidly on the idea that it is the most engaging and innovative field of education and that it readily accepts new approaches and creative teaching methods (Ellen et al., 2013). Yet surprisingly, only a few projects and studies are dedicated to exploring the potential of implementing gamification or gamified learning methods in formal art education in colleges and universities. Despite the increasing interest in gamification to enhance student engagement and motivation (Villagrasa & Duran, 2013; Wang & Lv, 2018; Tagie et al., 2022), there is a significant gap in research regarding integrating gamification into art and cultural studies.

Indeed, the literature suggests there have been few attempts to implement new educational technologies, such as gamification, in visual art education. Wang and Lv (2018) transformed the structure of their interactive design class at Chinese College using gamified methods he learned as a game designer. Wang and Lv applied a new award point system, immediate feedback, gradual challenges, decision making and a final surprise. Table 1 shows the difference in classes' structure before and after gamification. Compared to the previously established structure of the classes, the new methods made the learning process more engaging and gave new perspectives for studying the materials. The study's main findings include a significant improvement in study enthusiasm, satisfaction for lecturers, and teaching effect through applying gamification in college class teaching.

The research also provides new ideas for class teaching reform in China and gamification in education while acknowledging limitations in the experimental design and suggesting further research directions.

Table 1

Implemented gamification methods in Wang and Lv's (2018) interactive design class

Games	Classes without gamification	Gamified classes
final reward	“punishment point system”	award point system
immediate feedback	feedback at the end of the class or semester	applause from the class and points were instantly added to the table in front of everyone
“from easy to difficult” and “challenge players moderately”	graduation dissertation presentation without proper training in public speeches	4 phases of homework presentations: individual talks, team presentations, personal speeches and final assignment exhibition
decision making	no choice in what to study	additional flexible classes that students choose
“Easter egg”	-	the final surprise if students are proactive during the semester

Another experiment incorporating gamified methods into visual art studies took place at the classes of the Computer Animation course at La Salle, Ramon Llull University (Villagrasa & Duran, 2013). The researchers also implemented Problem-Based Learning and Quest-Based Learning techniques along with gamification. In line with the research previously mentioned, Villagrasa and Duran (2013) emphasised that students require motivation to feel accomplished and successful when tackling a learning challenge. Overcoming difficulties pushes them to the next level. They used similar techniques like quick feedback, but if Wang and Lv (2018) gave an immediate reaction, such as applause and points added to the familiar scoreboard, Villagrasa and Duran (2013) used constructive feedback that would guide the students. They also added a scorekeeping and levels system adopted from games based on collecting experience points that would transfer into the final grade.

Collaboration tasks were used to mirror multiplayer mode when students had to achieve the goal together. The authors also adopted quests and storylines: students had the opportunity to solve problems and role-play that they worked for companies that hired them for different types of animation works. Lastly, the course had a knowledge map that illustrated students' progress. It is worth mentioning that Villagrasa and Duran's study did not provide any measurement of the success

of these implementations, and the derived conclusion about gamification's impact on increasing effectiveness was mainly based on their own review of other works about gamification in education.

Coincidentally, the use of gamification in animation courses is also mentioned in Han's (2015) research, which explores the Self-Motivated Learning Environment created through gamification techniques. Han refers to the spiral curriculum as a best-suited curricular model for gamification as pedagogy, which he applied in a 3D Animation course in the Visual Communication Design Department at the University of British Columbia. The spiral curriculum is characterised by revisiting topics, increasing difficulty, relating new learning to previous learning, and increasing student competence (Harden, 1999). According to Han (2015), the spiral curriculum allows students to progress through increasing difficulty levels, similar to how players can choose difficulty levels in games according to their experience. This assumption supports Wang and Lv's (2018) concerns about the challenges that students face at the final public presentations without proper training and the reasons for implementing a gradual increase in challenges. The pace of learning is another essential characteristic of a spiral curriculum that aligns with the flexibility of redoing tasks without losing in games. Han's (2015) application of the spiral curriculum and gamification resulted in positive student outcomes. Firstly, the students' anxiety and fear about using complex software decreased significantly. Secondly, the safe and supportive environment created by the gamification approach boosted the students' creativity, and they were more willing to resubmit their projects after getting inspiration from their peers' works. Finally, the students could apply new methods to their artworks more efficiently and successfully.

Additionally, Han (2015) suggested that art students should have freedom in choosing when they want to show their work and what skills they want to gain or improve, which is not an option in most art courses. The importance of communication and collaboration was also addressed. According to the author, community support is a significant part of gaming culture that could be utilised in art education by showing students' works and openly discussing the progress with peers, developing critical thinking.

Gamified pedagogy in art education involves seven key elements, according to Han (2015). First, the teacher should use a spiral curriculum. Second, teachers and students should establish clear short-term and long-term goals. Third, the students should have the opportunity to resubmit their projects. Fourth, the students should be able to learn at their own pace. Fifth, the teacher should provide a safe environment for students to practise without fear of embarrassment. Sixth, the teacher should create a space for students to form a learning community. Seventh, the teacher should provide a platform for students to showcase their selected works.

Tagie, Merman, Taharuddin, and Ibrahim (2022) employed further approaches to using gamification tools in art education. When previous authors transformed their courses by utilising elements of game technology, educators from the College of Creative Arts brought digital tools for classroom learning. They combined them with other digital and analogue techniques.

Tagie and colleagues' paper delves into the difficulties teachers face while teaching art and design history in the context of current technological advancements and online education due to the COVID-19 pandemic. The authors express concerns about the decreasing attention span of students and suggest gamification as an effective approach to engage students and enhance their motivation and learning experience. The authors also mentioned the difficulties of effectively covering many historical facts and terms during the course. They describe gamification strategies like Quiz Whizzer, QR codes, and origami techniques as successful ways to improve student engagement and understanding of art and design principles. The authors also emphasise the importance of peer communication and collaboration in finding answers to questions and creating a fun and interactive learning environment. As per Tagie et al. (2022), gamification methods also helped students remember art history and enhance their social skills.

The results indicate that the students were receptive to the gamification approach, which in turn led to a positive response to the course. Even though the paper demonstrates that gamification can be applied as a small-scale change in curriculum and raise demand for further empirical and theoretical studies in art education, the methodological description of combining digital tools with origami needs to be clarified. Quiz Whizzer was used more as an assessment tool and a starting point for discussion. However, it does not help with the problem of teaching too much historical information more engagingly.

Moreover, compared to previous studies that were not dependent on smartphones or computers, Tagie et al. (2022) present the issue of the availability of digital tools and how technological limitations, such as slow internet connection, can influence class dynamics.

2.4.2 Gamified Cultural Heritage Learning

Although gamification has yet to be widely incorporated to enhance learning in visual art education, it has already gained significant interest in cultural studies, particularly in preserving cultural heritage (Angelopoulou et al., 2012; O'Connor et al., 2020; Klefodimos et al., 2023). Computer games have been incorporating cultural and historical heritage for a long time. Although not purely educational, they can be used as supportive tools for the learning process and as a starting point in developing serious games, educational quests or gamified courses (Konstantinov et al., 2018).

According to Marques et al. (2023), research on gamification in cultural heritage mainly originated from European institutions, particularly in Italy, Greece, the United Kingdom, Portugal, and Bulgaria. However, the study also noted that there were only a few authors with multiple publications on gamification and cultural heritage, suggesting that it may still be the subject of one-time publications rather than systematic research projects (Marques et al., 2023). Moreover, the same study found that heritage institutions were prevalent in gamifying heritage assets—the projects aimed to motivate and engage audiences and enhance creativity in heritage experiences. However, most analysed

gamification projects are directed at tourists and museum visitors, with a significant portion being directed at children.

Many studies on gamification in cultural studies focus on museum programs that border on touristic activities (Nóbrega et al., 2017; Gordillo et al., 2013) more than education. Even though innovative museum programs about cultural heritage lean not only toward improving visitor engagement but also to enriching learning experiences in museums, they do not have as strong objectives as educational programs in formal education settings. Additionally, studies have mentioned the concept of edutainment in the context of the gamification of museums (Madsen, 2020), which correlates with the noted difference between cultural studies in educational settings and museum activities.

In art studies, gamification is often used as a pedagogical approach (Villagrasa & Duran, 2013; Wang&Lv, 2018; Tagie et al., 2022). On the other hand, cultural studies tend to merely use digital platforms to enhance motivation and create an engaging educational experience. However, more research is needed on how gamification mechanics can be used to restructure courses in cultural studies.

Digital technologies such as augmented reality (Botrugno et al., 2017; Nóbrega et al., 2017), digital game add-ons for existing exhibitions (Madsen, 2020), and virtual (O'Connor et al., 2020) and mixed reality (Kleftodimos et al., 2023) are commonly utilised for creating gamified programs, courses, and applications related to cultural heritage.

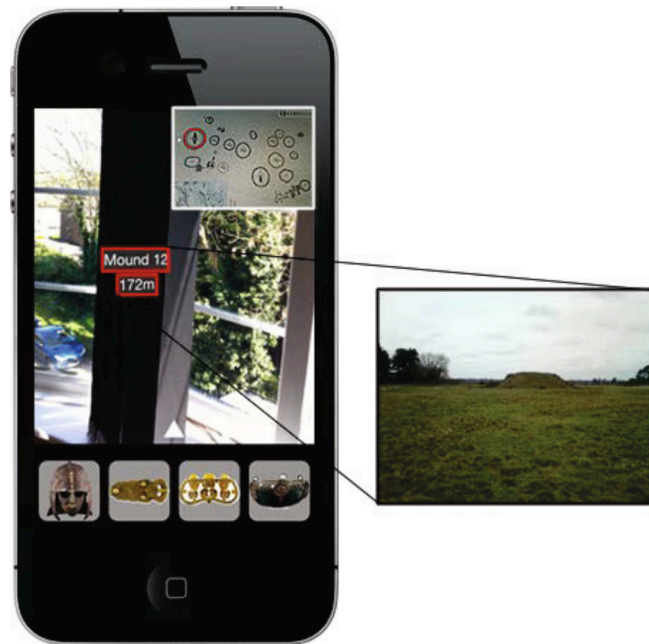
One successful example that bridges the entertainment elements of games and still holds educational purposes is I-Ulysses, a virtual-reality game based on James Joyce's Ulysses that uses gamification and explores the potential of pedagogy in preserving cultural heritage through an immersive experience. The project aimed to educate players on the narrative techniques of a classic literary work through an immersive VR experience. It aimed to integrate multimodal learning, provide real-time contextual information, and create an interplay between the book's themes and the virtual environment (O'Connor et al., 2020). O'Connor et al. (2020) emphasise the significance of storytelling as a valuable tool for educational content about cultural studies applied in the project as a multi-linear story where the journey depends on the chosen character. All stories were interconnected and provided interactive elements to explore new meanings in understanding Ulysses (Figure 4).

Figure 4*I-Ulysses gameplay*

Note. Colreavy-Donnelly, S., Ryan, A., O'Connor, S., Caraffini, F., Kuhn, S., & Hasshu, S. (2022, March 17). Leveraging Immersive Technologies to Support Blended Learning Post Covid-19. <https://doi.org/10.20944/preprints202203.0252.v1>. Copyright 2022, Colreavy-Donnelly, S., Ryan, A., O'Connor, S., Caraffini, F., Kuhn, S., & Hasshu, S.

According to O'Connor et al. (2020), user feedback indicated that the project successfully delivered an informative and educational guide to Ulysses while providing an entertaining virtual reality experience. The project also explored the use of virtual reality in adapting literary narratives, serving as a template for future projects that could target a broad audience.

Another example of using digital tools for cultural studies, combining outdoor and indoor educational activities, is the mobile-AR educational application for the Sutton Hoo archaeological site (Figure 5). According to Angelopoulou et al. (2012), gamification elements in the application aim to engage visitors aged between 11 and 16 in a team-oriented puzzle game. The application combines real and virtual objects, embedding exhibits into the game storyline and creating an exciting tour experience. Using mobile AR, each excavated real object has a virtual counterpart in its physical environment. Angelopoulou et al. argue that learners can enhance their environment by augmenting it with knowledge, and mobile AR systems facilitate "creation, distribution, and access of learning resources, collaboration and interaction, time and location independency, role changing, and achievement of learning outcomes".

Figure 5*The Sutton Hoo site application screen*

Note. From Angelopoulou, A., Economou, D., Bouki, V., Psarrou, A., Jin, L., Pritchard, C., & Kolyda, F. (2012). Mobile Augmented Reality for Cultural Heritage. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, 15–22. https://doi.org/10.1007/978-3-642-30607-5_2 Copyright 2012, Angelopoulou, A., Economou, D., Bouki, V., Psarrou, A., Jin, L., Pritchard, C., & Kolyda, F.

The Sutton Hoo site application is a treasure hunt-style game that offers two different modes of participation. The first mode is standalone, which is designed for individual visitors. The second mode is multiplayer, which is intended for organised groups of visitors. In this mode, participants are divided into two groups and explore Sutton Hoo and the British Museum simultaneously. Visitors at both sites engage in a treasure hunt scenario where the British Museum visitors guide the Sutton Hoo visitors to find objects using clues. The application provides remote communication and offers information about visitors and objects. Sutton Hoo visitors can use their phones for instructions and clues, just like in the standalone mode. They can also utilise the same tools and augmented content (Angelopoulou et al., 2012).

Another incorporation of new approaches to cultural heritage focuses on AR applications with historical information and pictures (Figure 6). Haugstvedt and Krogstie (2012) applied a technology acceptance model for hedonic systems to investigate the factors influencing users' intention to use such applications.

Figure 6

A screen of an AR application prototype on cultural heritage developed by Haugstvedt and Krogstie (2012)



Note. Haugstvedt, A. C., & Krogstie, J. (2012, November). Mobile augmented reality for cultural heritage: A technology acceptance study. 2012 IEEE International Symposium on Mixed and Augmented Reality (ISMAR). <https://doi.org/10.1109/ismar.2012.6402563>. Copyright 2012, Haugstvedt, A. C., & Krogstie, J.

A prototype AR application was developed and demonstrated to participants in a street survey to investigate users' acceptance. The app was later made available on the app store for broader access. Data collection involved using a questionnaire administered in the street and online web surveys (Haugstvedt & Krogstie, 2012). The results revealed that perceived enjoyment and usefulness play crucial roles in determining users' intention to use the AR application. Haugstvedt and Krogstie suggest that institutions developing similar applications should focus on creating a balance between the fun and usefulness aspects of the app.

Furthermore, the study highlights the importance of making picture material available to users and emphasises the need to continuously improve the application based on user experiences. The researchers also discuss the potential for incorporating user-generated content and explore the possibilities of developing similar platforms for other applications in the city, such as general learning services and mobile games (Haugstvedt & Krogstie, 2012).

Overall, this study provides valuable insights into the determinants of intention to use AR applications with historical information and pictures. According to Haugstvedt and Krogstie (2012), the findings can inform the development and improvement of such applications, focusing on both the enjoyable and practical aspects, ultimately enhancing the user experience and engagement.

2.4.3 Conclusion

In conclusion, gamification has shown potential for visual art studies curriculums and cultural heritage educational courses. Studies have demonstrated how various forms of game mechanics can be utilised in non-game settings. Positive outcomes such as increased engagement, motivation, peer dynamics, and a safe learning environment have been established in both gamified art studies and gamified applications for cultural studies. However, further research on gamification using action research methods will benefit educators and the field of Art and Humanities in education by providing a deeper understanding of how to incorporate new teaching methods and tools into curriculums.

2.5 The City as a Gamified Learning Environment

Cultural heritage and history are essential aspects of a city's fabric. It has been established that they can be learned through the urban environment, enabling people to understand the city's problems and how to address them (Şimşek et al., 2013). Innovative approaches for preserving cultural heritage have been discussed in a previous section, and an ever-increasing body of literature on gamification methods that can enhance the learning process and motivate students to learn more about their surroundings has emerged (Angelopoulou et al., 2012; Haugstvedt & Krogstie, 2012; O'Connor et al., 2020). At the same time, there is an opinion that interactive city-based projects attract tourists more than local residents (Haugstvedt & Krogstie, 2012). This section delves deeper into various methods of integrating gamification into cultural studies. It focuses on case studies that involve location-based exploration of the urban environment. Despite the significance of this subject, there is a need for more scholarly exploration, which is hindering the development of comprehensive insights.

2.5.1 City as a Learning Environment

Şimşek et al. (2013) have argued that there is an urgent need to develop cultural heritage programs integrated into the urban environment. The lack of understanding of how and why cities have been changing leads to urban reconstruction projects being done without the participation of residents, who are subsequently silent users of this environment. Moreover, restructuring the urban environment often leads to the loss of cultural heritage (Şimşek et al., 2013), ultimately leading to cultural transformation. Imagine a man passing by a street whose houses are covered with certain historical tiles. The man does it every day. Gradually, the facades of the houses had been changed while losing their pristine appearance. After a few months, the man will no longer see this seemingly insignificant detail to which he did not attach importance. However, he still remembers the intricate details of the patterns connected to the street's history. That is just that the next generations will no longer know how the facades used to look, and consequently, part of the history vanished.

Awareness is one of many objectives that could be learned through the cities. Without realising it, people have been learning things from cities daily from a young age: dimensions, shapes, colours, texture, smells, speed, and language (Gordillo et al., 2013). It is merely a small list of things people face going outside. Of course, many people also learn through contact with nature, which is one of the reasons educational institutions worldwide practise outdoor activities and field trips (Behrendt & Franklin, 2014). The idea of learning through the environment is well-known, but cities are often overlooked in this regard. However, a few exceptions exist, such as the City of Helsinki.

In 2019, Helsinki launched a week-long educational initiative called *The Whole City is a Learning Environment!*. The program consisted of various educational activities for students from different schools across the city, which took place in several locations throughout the city. Many locations were connected to nature, including Helsinki Central Park, Viikki, the island of Harakka, and Suomenlinna. This was due to Helsinki's urban environment, closely linked to nature. The program also aimed to raise awareness about the urban environment with visits to the Helsinki Baltic Herring Market and the urban planning office.

Often, educational programs related to the urban environment use the city as a context rather than a stage for actual learning. For instance, *Education Cities* (n.d) created The Urban Innovation Lab, facilitating connections between business representatives, municipal officials, and urban developers with teachers and students. In this initiative, the city is viewed more as the surroundings that encircle its inhabitants, and the components of the city that already carry information are seen as optional actors of the program. While collaboration among community members is a valuable concept for creating long-lasting relationships, it is also crucial to build connections between the residents and the city (Şimşek et al., 2013).

As well as cultural preservation projects, innovative urban courses focus more on children than university students (Ballagas et al., 2007; Koutromanos & Styliaras, 2015; Kleftodimos et al., 2023). However, due to the structure of modern cities, children are deprived of autonomy in the urban landscape. All their urban activity is associated with adults who direct their movements, and, accordingly, this directly affects the weak ties of children with the surrounding urban environment (Germanos, 1995).

Tonucci and Rissotto (2001) claimed that cities have become more hostile toward people. Hence, people tend to hurry up to the safe zones of their houses rather than build relationships with the urban environment. It is also possible that adults' perception of the danger of the cities had their relationship with the environment transfers to the children (Hart, 1979; Spencer & Blades, 1985; Blakely, 1994). Those beliefs lead to the development of the project Children's City (Project - La Città Dei Bambini, 2019) with "the purpose of exchanging information between the cities and of providing methodological support for the various initiatives" (Tonucci & Rissotto, 2001). The project brings children's views on the urban fabric, and together with architects, town planners and environmentalists, they develop the urban environment projects that change the city.

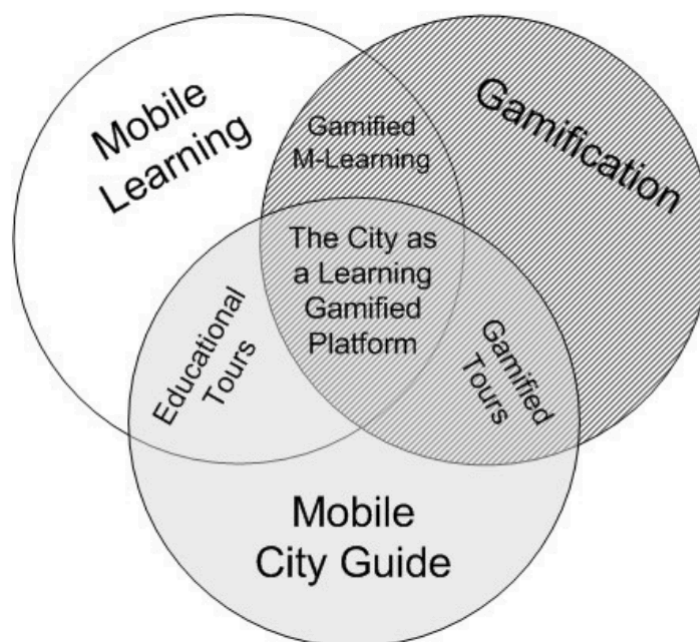
The project and book *City as a Classroom* (Arki_lab, 2019) present a unique perspective on using a city for educational purposes. Rather than being confined to traditional indoor classrooms, the project explores outdoor learning as a holistic approach to education. Arki_lab (2019) placed students in an urban environment and transformed outdoor spaces into a classroom, highlighting that a classroom is not limited to just an indoor space. By utilising the city as a physical space for classes, students could learn in a real-world setting, and the urban environment became an ideal classroom that was adequately equipped for their needs. While the project did not focus on the interaction between the city and students, it demonstrated cities' potential as a learning space.

2.5.2 Gamified Location-Based Learning

Another approach to the city as a learning environment is using gamification. The field of art and cultural education has witnessed a surge of interest in gamified location-based software (Haugstvedt & Krogstie, 2012), with a particular interest in storytelling (Bellotti et al., 2003; Klefodimos et al., 2023) and treasure-hunting types of applications (Angelopoulou et al., 2012) that explore the outdoor environment. Gordillo et al. (2013) combined mobile learning with gamification and urban environment. They designed the Learning Gamified Platform model that can be used for formal and informal education. The model consists of three correspondent components: tourism, learning and gamification (Figure 7).

Figure 7

The City as a Learning Gamified Platform research field



Note. From Gordillo, A., Gallego, D., Barra, E., & Quemada, J. (2013, October). The city as a learning gamified platform. In 2013 IEEE Frontiers in Education Conference (FIE) (pp. 372-378). IEEE. Copyright 2013, Gordillo, A., Gallego, D., Barra, E., & Quemada, J.

There are two scenarios for using the platform based on the model. The first scenario applies to formal education. It implies that the teacher or tutor creates an educational tour for the students following the subject or specific topic from the curriculum. In this case, students would go outside the classroom to explore the activities that were placed in the tour program. The tour adopts "the entire city as the learning environment" (Gordilo et al., 2013). The platform is flexible in adding necessary activities, choices of evaluation, and tour duration. The second scenario is using the platform without an instructor and outside of the curriculum, so this is a scenario for non-formal education. This tour differs from the first scenario by the type of activities and a more general game model. The user will be able to choose a hero and tour setting. Instead of teaching materials, it offers to search for virtual objects. This scenario also involves the use of an augmented reality feature.

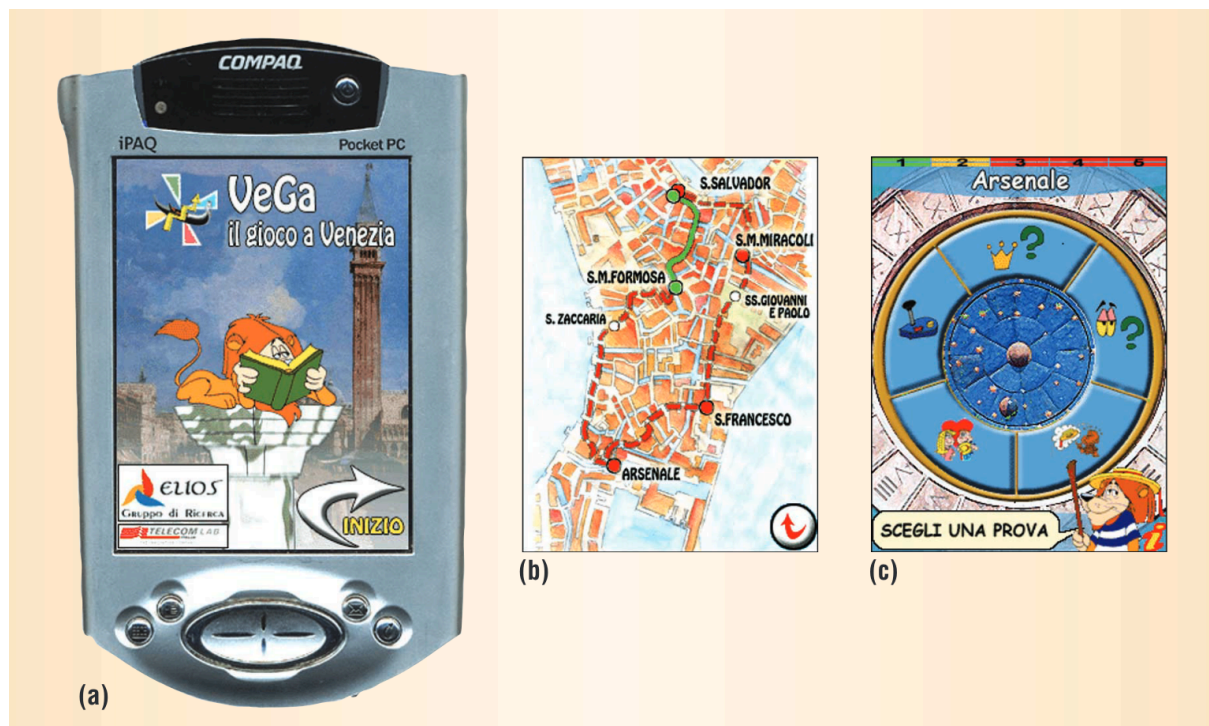
Gordilo et al. (2013) assumed that the learning component in the second case would be weaker than in the first scenario due to the vital gamification element. Using standardised E-learning tools for creating educational tours is also emphasised. Despite the differences in scenarios, they share the same main characteristics of the platform: a focus on educational content and interaction with the city. The Learning Gamified Platform model came closest to using the city as a learning environment. Still, it is worth noting that the focus of the model itself is on using such a platform to study history-related subjects, and the hidden knowledge that the city's surfaces carry is used somewhat limited.

It is important to emphasise that in the model, the authors do not mention the safety of using this kind of platform. As it was mentioned above, this is one of the main elements of the learning environment. The developed model also needs to consider the participants' age, learning theories, and teaching methods that could be used to create the platform and integrate them into the proposed tours.

The city as a stage for learning attracted scholars and educators even twenty years ago. One of the more successful attempts to gamify cultural education is VeGame (Figure 8). This game combines wireless and ubiquitous computing technologies to connect the physical world with web resources (Bellotti et al., 2003). It follows constructivist learning philosophies and is designed as a treasure hunt for students aged 15 to 20, but the general public and tourists can also use it. Players are grouped into teams and compete for scores, with session standings and a "hall of fame" recording participants' scores. The game involves stages showcasing points of interest in Venice and offers microgames in various categories.

Figure 8

VeGame initial page, map, and stage menu screens



Note. From Bellotti, F., Berta, R., De Gloria, A., Ferretti, E., & Margarone, M. (2003, September). Vegame: exploring art and history in Venice. *Computer*, 36(9), 48–55. <https://doi.org/10.1109/mc.2003.1231194>. Copyright 2003, Bellotti, F., Berta, R., De Gloria, A., Ferretti, E., & Margarone, M.

The games are divided into different types with various objectives like developing cognitive activity, analysing cultural and historical events, social interaction, and understanding the surrounding environment (Table 2). Users must interact with the surrounding environment to solve puzzles or finish tasks. For example, users must find and look at the original painting in the museum to reconstruct it in the game. There is also the challenge of navigating the streets of Venice without GPS, which, at the time of game testing, was not available for that area (Bellotti et al., 2003).

Table 2

Objectives in the VeGame project

Type of games	Objectives
Observation games	develop cognitive activity, stimulate spatial processing skills
Reflection games	open discussions, analysis of cultural and historical events
Action video games	develop cognitive activity, social interaction, understand the surrounding environment

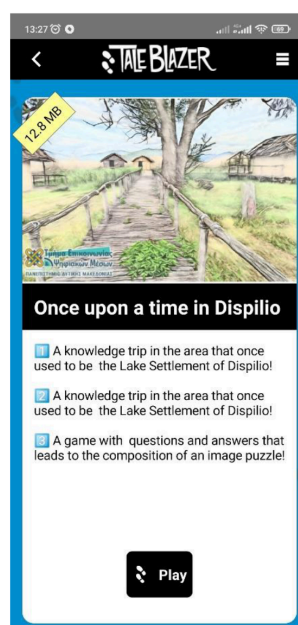
Bellotti et al. (2003) argue that the game allows users to leisurely discover and appreciate Venice's cultural heritage without any time restrictions. This links with a spatial curriculum successfully applied by Han (2015) in a 3D animation course, but the aims for the same approach are different: Bellotti et al. focus on the effectiveness of accurate observation without a time limit, while Han aims to provide a less stressful environment and enhance creativity.

According to Bellotti et al., educational games should support critical reasoning and reconstructing relationships among objects in the environment rather than simply providing cultural information. Even though, from a technological point, VeGame is an outdated game, the methodology of the educational quest for learning art and culture can be easily adapted to new technology.

Recent work has demonstrated that location-based augmented reality applications can be the perfect educational tool while enriching students' engagement (Kleftodimos et al., 2023). The study analyses two location-based augmented-reality apps used to educate the public about Dispilio, a prehistoric lake settlement in Kastoria with cultural heritage significance (Figure 9). One application is informative, and the other is a storytelling experience, but both provide knowledge about prehistoric settlements. Both applications were developed on the *Taleblazer* platform, which offers affordable tools for incorporating gamification elements. Gamification was used to engage visitors and inform them about the settlement's way of life and artefacts. The applications were tested with university and high school students.

Figure 9

Once upon a time in Dispilio, starting and question screens



c

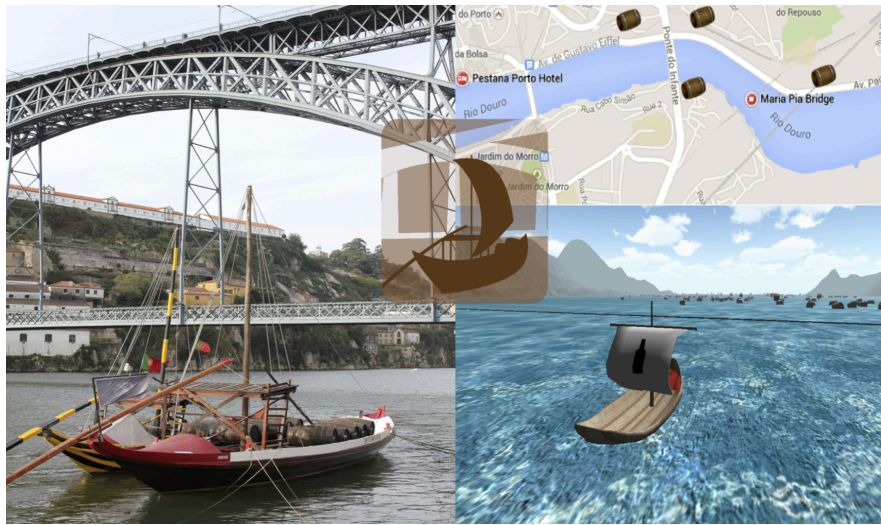
Note. Kleftodimos, A., Moustaka, M., & Evagelou, A. (2023). Location-Based Augmented Reality for Cultural Heritage Education: Creating Educational, Gamified Location-Based AR Applications for the Prehistoric Lake Settlement of Dispilio. *Digit.*, 3, 18-45. Copyright 2023, Kleftodimos, A., Moustaka, M., & Evagelou, A.

Storytelling in developed applications was an essential method that spiked a significant interest in students. However, they admitted that informative applications were more educational, overall, they received better responses from testers. (Kleftodimos et al., 2023).

Additionally, the study raised a critical issue of technological and economic affordance that other scholars also address (Tagie et al., 2022). According to Kleftodimos et al., most studies on gamification in art and cultural studies focus on developing AR applications using tools like Unity, Vuforia, Arkit, and ARcore, which require advanced programming knowledge and hence less accessible for educators with little or no programming knowledge. Tools like ARIS and Taleblazer that have more potential for educators are being utilised less and have yet to be studied.

One more project based on AR technology is the VisAge (Julier et al., 2016), which aimed to investigate the potential use of a community-based Augmented Reality system for sharing stories and cultural histories related to urban environments. The project focused on increasing user engagement and immersive experience by developing an online portal to create and access digital content. The ultimate objective was to create an open platform for local communities to collectively build and access shared memories and stories through AR technology. Their AR model utilises spatially distributed Points of Interest (POIs) in an online database that includes text, images and audio. Users can add or modify POIs, and others can view the new content. Although the authors mentioned the educational element of the model, it has yet to be confirmed that it has any educational potential. At this stage, the project focuses more on community and utilisation of AR technology for sharing information more engagingly than on learning about heritage and urban environment.

Another example that bridges tourism and education is Unlocking Porto (Figure 10), a storytelling game that uses the actual city as a game board (Nobrega et al., 2017). The game uses location-based technology, augmented reality, and multimedia capabilities to immerse players in the city and tell a story. The media sources for the game include static elements like videos and images, as well as dynamic elements such as real-time information from maps and social media. The project aims to combine educational context, storytelling and engaging activities for visitors in Porto, Portugal.

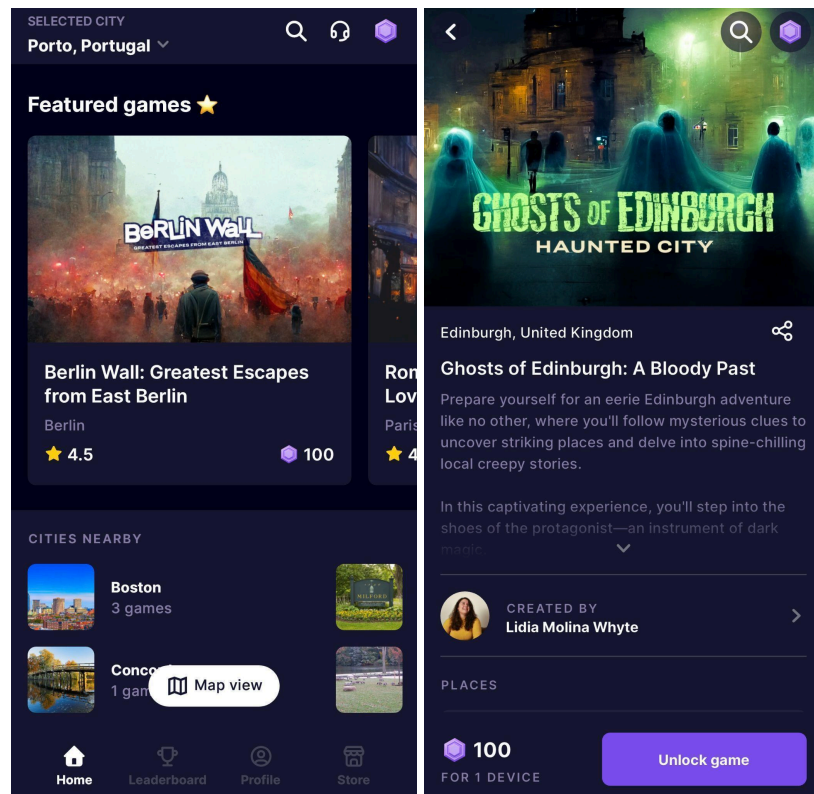
Figure 10*Unlocking Porto application screens*

Note. From Nobrega, R., Jacob, J., Coelho, A., Weber, J., Ribeiro, J., & Ferreira, S. (2017, October). Mobile location-based Augmented reality applications for urban tourism storytelling. 2017 24o Encontro Português De Computação Gráfica E Interação (EPCGI).IEEE. Copyright 2017, Nobrega, R., Jacob, J., Coelho, A., Weber, J., Ribeiro, J., & Ferreira, S

Unlocking Porto, along with VisAge (Julier et al., 2016), employs POI to gather data from its users that can be used to enrich the storyline. However, according to Nobrega et al. (2017), content creators are still responsible for developing a viable narrative, and POI can only be utilised as an ancillary tool.

One of the promising applications that has gained audience interest and can serve as an educational tool despite being solely focused on tourism is Questo (Figure 11). This application offers unique and authentic experiences to both tourists and locals by creating tours that involve play and discovery elements through storytelling (Sabou & Maiorescu, 2020).

Figure 11
QUESTO menu and tour description screens



Note. From *Questo: Play & Explore Fun Tours by Local Storytellers*, 2021

Users start their journey at a specific point in the city and receive a hint through the application, which they must solve to get to the next place on the route. Each new place they discover comes with a story they can access through the application, and a new clue is provided to guide them to the following location (Questo: Play & Explore Fun Tours by Local Storytellers, 2021). Users can become the creators of quests and earn share sales (Questo Creators Room, n.d.). No studies have yet been published about the application.



Cities can provide an excellent platform for gamified learning, offering immersive experiences and real-world learning opportunities. The success of projects such as *VeGame* (Bellotti et al., 2003) and *Unlocking Porto* (Nobrega et al., 2017) have shown the potential of cities to enhance education. However, participant safety must be a primary concern for any educational initiative in urban environments. The development of such projects has been made more accessible with the launch of tools like *Taleblazer*. These tools can provide models similar to *City a Learning Gamified Platform* (Gordillo et al., 2013) with an easier way to implement the exploration of cities in the curriculum.

Although more research is needed, these initiatives represent promising steps towards transforming cities into dynamic learning spaces.

2.6 Conclusion

This review highlights the effectiveness of gamified learning and gamification in enhancing engagement, motivation, and communication among educators and students in various educational contexts (Villagrasa & Duran, 2013; Wang&Lv, 2018; Tagie et al., 2022). It also identifies the difference between incorporating gamification in Visual Art Studies (Wang&Lv, 2018) and Cultural Studies (Kleftodimos et al., 2023). While the former emphasises pedagogical approaches, the latter mainly explores digital tools as add-ons for learning.

Our review also reveals a gap in combining gamification and transformative learning theory despite their potential to improve learning processes. Furthermore, the field of location-based learning for gamified educational software still needs to be developed. Although existing projects have proved the benefits of outdoor education (Fägerstam, 2012; Abdullah et al., 2021), the affordability of developing such applications needs to be considered. *Taleblazer*, a new software development, may bring more attention to building location-based educational courses.

We aimed to determine whether location-based gamified software can be an effective tool for learning art and culture in formal education settings. Though the question remains open, the review provides a solid foundation for further theoretical and empirical research.

3. Research Methodology

3.1 Introduction

This chapter provides a detailed overview of the methodology used in this study, which aims to create and test an educational mobile application that uses location-based technology and gamification features. The development process is based on feedback from educators and communication with educators and students from Visual Arts and Cultural Studies courses. This study is founded on the idea that educators and students should be at the centre of educational research. Therefore, it employs qualitative methods and is structured in multiple phases, integrating qualitative and iterative approaches to ensure that the perspectives and experiences of educators and students are central to the development of a user-centred educational tool.

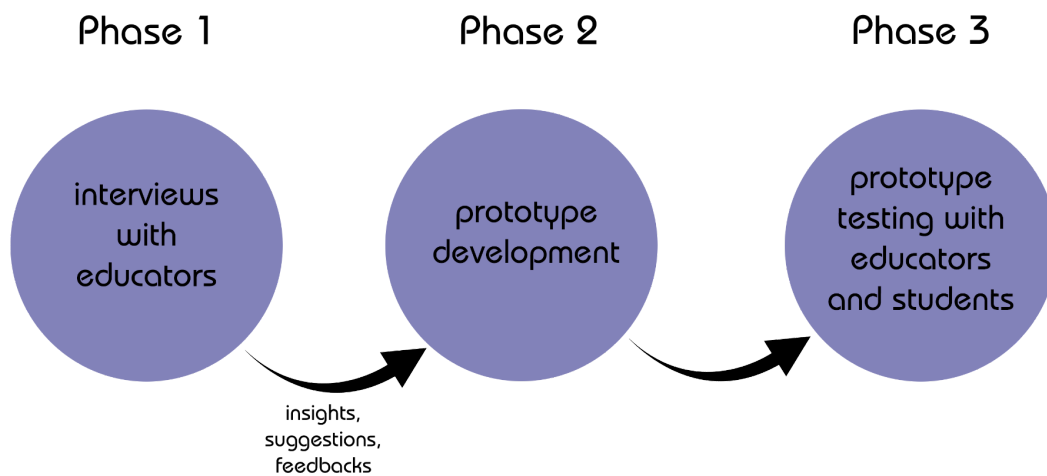
To achieve this, the research design is structured into three key phases: in-depth interviews with educators, prototype development, and comprehensive testing of a prototype with both educators and students. Each phase leverages qualitative methods to gather rich, detailed data that inform and refine the application.

This chapter details the research design, participant selection, data collection methods, and data analysis procedures for each phase of the study. It also discusses the ethical considerations, challenges and limitations of the study. The chapter aims to provide a clear and thorough understanding of the research process and the steps taken to achieve the study's objectives.

3.2 Research Design

The study's structure is based on Design-Based Research (DBR) principles. It aimed to address the assumed lack of use of cities as an effective learning environment for engaging pedagogy. Practitioners guided the development of an educational tool to test the prototype of an application with educators and students to stress the hypotheses. The study consisted of three phases (Figure 12).

Figure 12
Phases of research



During the first phase, I conducted semi-structured interviews with educators to gather insights into their needs, preferences, and experience with gamification, outdoor learning and modern educational technology. Eight educators were selected through purposeful and snowball samplings to ensure diversity in subject areas and years of experience. The interviews were conducted face-to-face or via videoconference, after which each interview was transcribed verbatim. Afterwards, thematic analysis was applied to identify key themes. The participants also reviewed the preliminary mock-ups of the mobile application. These interviews provided a foundational understanding that shaped the future design of the application.

In the second phase, I used the results obtained from the interviews to guide the development of the prototype. This phase focuses on an iterative design process to ensure the application meets user needs and serves as an educational tool. I first created mock-ups of the application in Figma and then transferred them to Protopie to develop the final version of the interactive prototype.

The third phase focused on testing the prototype with educators and students. I had ten individual meetings with educators and students who walked around the Faculty of Fine Arts for approximately 60 minutes while using the application. Through think-aloud protocols and post-use interviews, I collected qualitative data on the application's usability and effectiveness, which is crucial for iterative improvements.

3.3 Participants Selection

The study employs purposeful and snowball samplings to select participants for each phase. For the first phase, the sample consisted of eight educators from the Fine Arts and Cultural Studies faculties

with more than two years of experience in teaching. The geographical limit was set to Portugal, and educators from Porto and Lisbon were chosen in the final sample. Most participants were found through university websites, after reviewing bachelor's programs curricula. Some were suggested by other participants or professors at those Universities.

Prior to conducting the third stage of this research, I reinvited the first stage participants to test the prototype; five participants agreed. I selected a second group of additional seven participants from BA students enrolled at both the Faculty of Fine Arts and the Faculty of Arts and Humanities at the University of Porto. These students were identified with the help of professors who were interviewed in the first phase and then assisted in organising the testing with their students. In either stage, the study did not take into account the gender and age of the participants. It is worth noting that the participants of the first interviews had different teaching experiences (areas, type of classes, years of teaching) that can influence their response to the discussed topics.

Educator A teaches practical and technical courses about Sculpture and has taught for the last three years in bachelor's programmes. Educator B teaches mostly practical classes about Drawing and has 35 years of teaching experience with bachelor's, master's and PhD students of Fine Arts and architecture. Educator C has taught theoretical courses for around 14 years related to the History of Art, Heritage and Visual Culture, and Digital Humanities for bachelor's and master's students in various programs. Educator D has 23 years of teaching experience in New Media Art and Digital Culture for bachelor, master and PhD students. Educator E has taught Art History to bachelor's and master's students for the last five years. Educator F has three years of experience with bachelor's students in teaching Cities and Urban Cultures. Educator G has three years of experience teaching Digital Art courses for bachelor's and master's students. Educator H has been teaching for 17 years a variety of theoretical and practical courses for bachelor, master and PhD students but now primarily teaches Digital Humanities.

3.4 Data Collection Methods

This section outlines the data collection methods employed in this study, which involve three primary phases: conducting in-depth interviews with educators, testing the prototype of the educational mobile application with the same educators and their students, and conducting post-use interviews with the participants. These steps are designed to gather comprehensive qualitative data to inform the development and iterative refinement of the mobile application.

Phase 1: In-Depth Interviews with Educators

The first stage aimed to gather in-depth insights about issues, preferences, and the use of gamification, outdoor learning, and digital tools in education. In addition to questions about educators' experiences and opinions, respondents were asked to review a mock-up of a future location-based mobile application and evaluate its design, topics, activity types, navigation, appeal to students, and creativity.

The semi-structured interviews lasted one to two hours. Four interviews took place in the university setting, three were conducted online, and one was held in a cafe. Audio of both the face-to-face and online interviews was recorded with the participant's consent for accurate data capture. During the interviews, additional notes were taken.

An interview guide with open-ended questions was used to direct the conversation. The guide was divided into two main parts: questions related to education and questions about mock-ups. The interviews started with a brief description of the study and general questions about educators' experience, the students' levels, the type of subjects they teach, and the courses they teach. After that, topics of their teaching methods and challenging aspects of art and cultural education were covered. The next part of the questions related to their understanding of gamification and their experience. Finally, outdoor learning, the implementation of education tools and the future of education were discussed.

After the main part of the interviews was completed, the participants were shown examples of three different educational walks using mock-ups of the application. These walks were designed to test various activities and topics. Three walks included different types of activities and tasks, such as counting colours and typing the answers, using the camera to find information, touching the screen to delete or open information boxes, and connecting answers. The detailed work on the mock-ups and final prototype will be discussed in the next chapter.

After reviewing the prototypes, the educators were requested to provide feedback on the design, activity types, suitable topics for students, the attractiveness and implementation of similar applications, and any suggestions for features.

After the interviews, transcriptions were made of the audio recordings to maintain accurate records of the conversations. Note that all transcripts and recordings were securely stored to preserve confidentiality and data integrity. The culmination of this process was a detailed report summarising the key themes and insights from the interviews, providing valuable input for the initial design of the mobile application. The next section, about data analysis, will cover all changes made to the prototype's design after the interviews.

Phase 2: Testing the Prototype with Educators and Students

The objective of this stage was to assess the usability and effectiveness of the mobile application prototype with educators and their students through face-to-face individual testing sessions. As

described before, the same educators who participated in the interviews were invited to test the prototype, along with a sample of their students, thus ensuring continuity and allowing educators to see how their input has been integrated into the application design. Only five of the educators were able to participate in the testing due to time or location constraints.

The testing process was carried out individually with each educator and student to provide a controlled environment for observing interactions and gathering feedback. The testing started near the Faculty of Fine Arts of the University of Porto building, where the educational walk in the application starts. The testing lasted 40-60 minutes.

Participants were asked to verbalise their thoughts using the application through a think-aloud protocol, providing real-time insights into their user experience, including usability issues and intuitive design elements. We observed participants' interactions with the application, noting any difficulties, confusion, or positive reactions.

Phase 3: Post-use Interviews with Educators and Students

After using the application, educators and students participated in a brief post-use interview to discuss their experience, focusing on usability, functionality, engagement, interaction with a city, learning process and suggestions for improvement. Most of the interviews (n=10) were conducted in the Faculty of Fine Arts of the University of Porto and lasted 20-30 minutes. These interviews were semi-structured and followed the question guide, divided into six categories: overall experience, usability, performance, design and aesthetics, learning, and feature requests. The questions were partly based on the Learning Object Evaluation Scale for Students (Kay & Knaack, 2008).

As before, all testing sessions and post-use interviews were audio-recorded and transcribed to capture detailed feedback, and all data was securely stored. The data were then analysed through usability and thematic analysis to identify common usability issues and user behaviours and extract key insights and suggestions for improving the application.

The testing and analysis resulted in a comprehensive evaluation report highlighting usability issues, user feedback, learning curve, engagement, interaction with a city and recommended improvements, which will guide further refinements of the mobile application.

3.5 Data Analysis

As discussed previously, the study was divided into three main phases: interviews, prototype development, and prototype testing. This part of the chapter covers the applied approach of thematic analysis to the plethora of information gathered during each stage, focusing on the processing of the data from the interviews with educators, the prototype testing and feedback analysis.

First interviews' analysis

The analysis started with transcribing all audio recordings with the Turboscribe tool and editing any mistakes afterwards. Even though there were no discussions of any personally sensitive information, the interviewees shared critical statements about the academic environment, so to protect their rights, each transcription was edited and composed into separate documents with changed names and without any personal information that could identify the respondents.

The data analysis process continued with creating a list of codes based on the literature review, including themes such as games, learning process, challenges, outdoor learning, engagement, and affordability. Initial readings of the data involved highlighting the most relevant quotes using colour coding. Subsequent readings focused on developing codes based on these quotes and identifying themes, aiming to create no more than five main categories. This stage was followed by concept mapping to visualise relationships and connections between themes. These categories were then further analysed, considering aspects such as comparisons, models, visuals, and connections. The conclusion of this process was the drafting of a report detailing the findings from the data analysis for each theme.

Prototype testing and feedback analysis

After the testing sessions, all audio recordings were transcribed and composed into one file, along with notes on participants' behaviour and feedback. The names were changed to aliases, and all personal details were cut out.

During the first readings of the gathered responses, we highlighted everything that referred to usability issues and themes created during the interviews according to the colour codes from the first interview analysis. For further usability analysis, we made a table that shows light corrections that can be fixed in the current prototype, bugs and crashes that happened due to the software where the prototype was designed, and complex corrections that need time to be fixed.

All quotes related to the themes were composed in a separate document for the final analysis of connections, comparisons, models and visuals. The next chapter will cover the prototype development in detail, as well as the testing sessions and corrections that were made during and after the testing.

3.6 Ethical Considerations

The study follows ethical guidelines to protect the rights and well-being of participants. Informed consent is obtained from all participants, and their confidentiality and anonymity are maintained by using synonyms and excluding any personal details that could lead to their identification.

Another ethical concern is the use of AI-generated images in the initial prototype. It's important to note that the images were used for testing due to the study's financial and time limitations. Considering the controversial nature of AI systems and ongoing debates about copyrights, these images will be replaced with ones created by artists who do not use AI in the future development of the application. Participants were informed about the use of AI.

3.7 Challenges and limitations

During the research process, several challenges emerged. One of the primary difficulties was identifying the correct types of tasks and activities that could be designed or imitated in Protopie. Ensuring that interactions with the city were integral to each task added another layer of complexity. Among the various tasks, those involving symmetry, balance, and perspective proved to be the most challenging to design, often requiring multiple revisions.

The diversity of the tasks also presented its own set of challenges. Each task needed to be distinct yet cohesive within the overall project framework. Additionally, the logistics of mapping for nodal storytelling required careful planning and precision.

Implementing the nodal storyline was particularly problematic in Protopie, as it stretched the application's affordances to its limits. The prototype thus had lagging issues which hindered its smooth execution. This technical limitation necessitated frequent adjustments and workarounds. The final version of the prototype followed the linear storyline because the Protopie application crashes could not be fixed. It also took a lot of time to find solutions for fixing the tasks that involved the camera because of the app crashing. They had to be redesigned for the final testing.

Another significant issue was knowing when to stop editing the prototype and transition to the testing phase. Balancing the desire for perfection with the practical need to test and iterate was a continuous struggle throughout the project.



Despite careful planning and execution, this study faced several limitations that may have influenced the data collection process and the overall findings. First, there was a language barrier that interfered with clear communication and understanding with participants. The application was designed in English, significantly impacting the recruitment of the participants for the testing. Second, a lack of time and the tight schedules of educators and students, especially during May and the beginning of

June when they had exams and final deliveries, posed considerable challenges for testing as well. Third, the survey received limited responses from educators due to their lack of understanding of the field and gamification. Finally, the small sample size limited the generalisability of the findings. These constraints influenced the research outcomes and the overall effectiveness of the project.

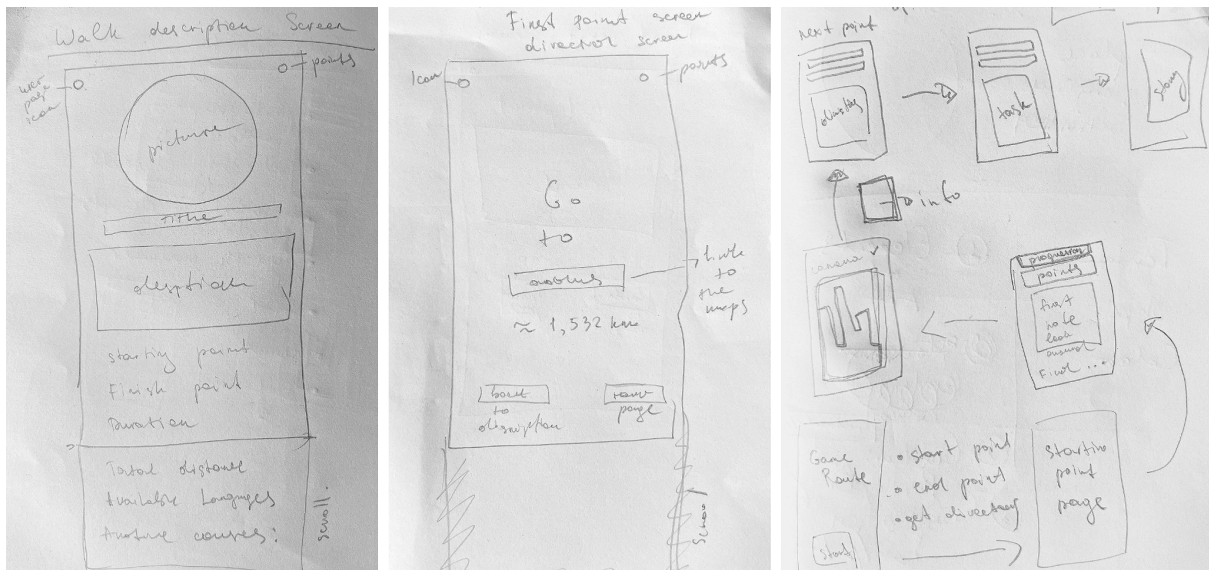
4. Prototype

4.1 The Mock-ups for the Interviews

The first step in prototyping the application was drawing sketches that identified all necessary screens, buttons, icons, images, text boxes, and navigation (Figure 13). At this stage, a list of possible topics was also created that later would be at the core of the three walks designed for the mock-ups that were shown in the first interviews with educators.

Figure 13

The first Mock-ups



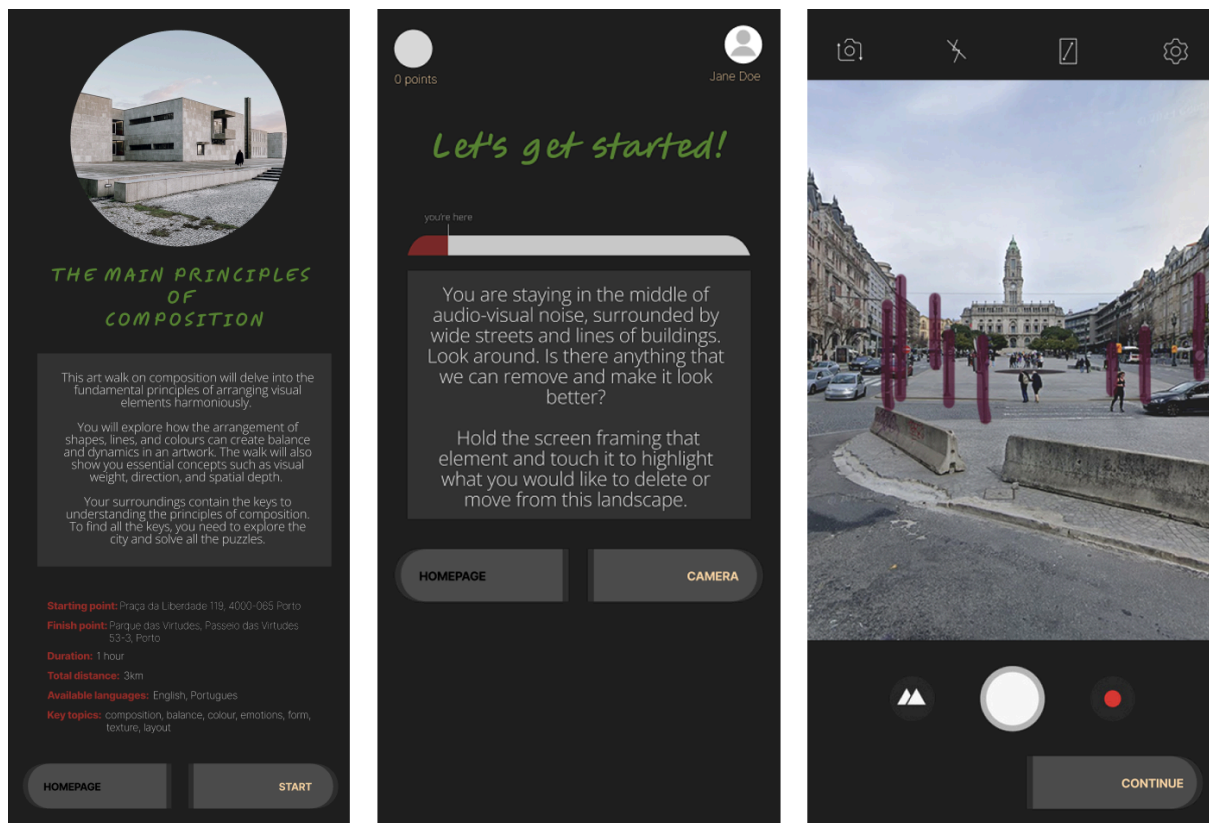
After establishing the topics, we designed the educational content, with the objectives, the types of activities to complete, and the texts for each walk. Also, at this stage, the gamification mechanics were introduced by adding a scoring system and a duration bar, as well as a set of interactions (either tasks or ways of obtaining information such as touching the screen or tilting the smartphone), alongside a navigation system where users could choose their route according to their points of interest. Additionally, the first mock-ups featured a home screen, directions screens, a description of the walks, a screen with educational material, introductions of tasks or activities, and tasks or activities screens. The walks would be set in three different Porto locations.

The goal was to test which topics and tasks or activities the educators would perceive as the most effective, educational, and appealing, both for them and for their students. The walks were not entire completed journeys, but the combination of various critical topics and interactions.

The first walk focused on the basic principles of composition, such as arranging elements and learning about symmetry, balance, and colours. It was the most practice-oriented walk. It proposed three kinds of interactions: using the application camera and highlighting unnecessary elements, detecting the most symmetrical view with the application, finding the brightest element around, and typing the answer (Figure 14).

Figure 14

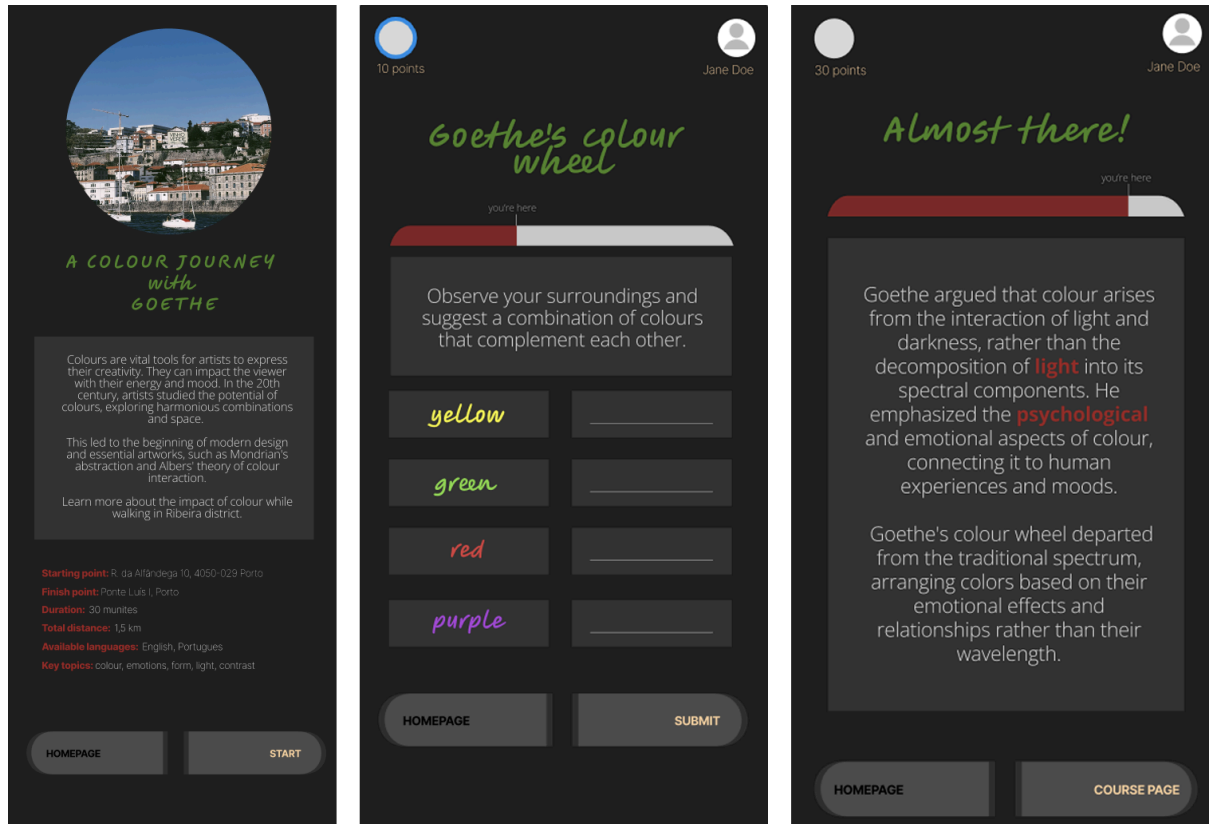
Mock-ups for walk #1



The second walk explored Goethe's colour journey and provided detailed information about colour theory. This topic was more specific and implied that users have at least basic knowledge of colour theories. This was the walk that combined theoretical knowledge and practical application. The tasks proposed were for users to count the colours around them and type the answer; to find the right combination of colours and type the answer; to look at the app camera and touch different colours to open relevant information (Figure 15).

Figure 15

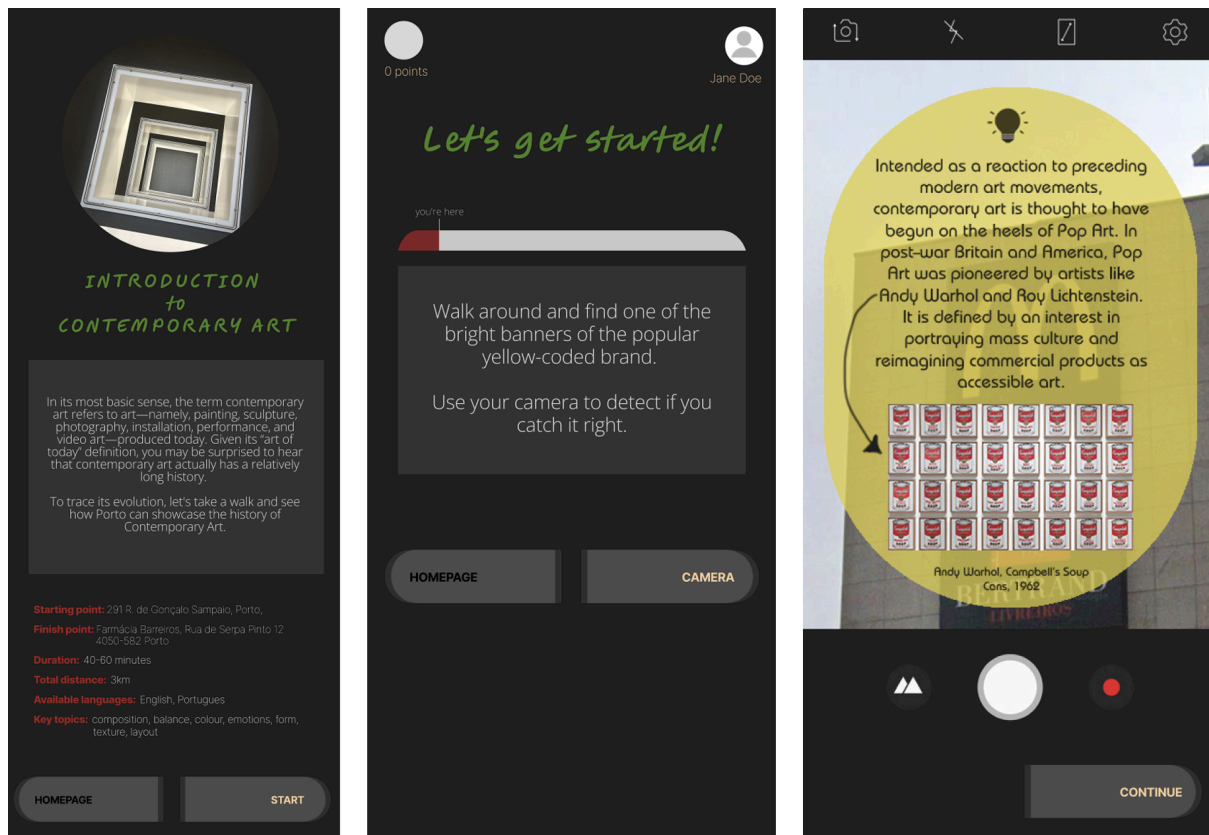
Mock-ups for walk #2



The third walk was centred on contemporary art and involved fewer interactive activities, instead focusing on delivering facts about the history of contemporary art. It was the most theory-oriented walk. The proposed activity was to detect different things (e.g., find one of the bright banners of a popular yellow-coded brand) to open the information about famous pop artists (Figure 16).

Figure 16

Mock-ups for walk #3



4.2 Designing the Interactive Prototype

After analysing the first interview and creating a list of suggestions, the next phase was writing and designing the final walk before moving to interactive prototyping. The chosen topics were based on the suggestions from educators and the study of the curriculums of the Fine Arts programmes. Additionally, after the interviews and literature analysis, it was decided to add storytelling to the mentioned elements of the mock-ups. Storytelling was discussed previously as a method that spikes interest in students (Kleftodimos et al., 2023), and during the interviews, it was mentioned as a “possible glue for the educational materials” that also “gives the hidden knowledge in an indirect way.” At this stage, before moving to designing the prototype’s content, it was essential to research which prototyping software would match all criteria, such as featuring camera access and dynamic interactions, while having a ‘low-code’ environment and being affordable. The initial plan to build the prototype in Figma did not succeed due to the limited dynamic interaction options. An attempt in the Noodl application was also eliminated, as it proved less compatible and afforded limited interactions.

Therefore, the final choice was the Protopie application, which is the most suitable for interactive prototypes because of many dynamic interactions, including camera functions, conditions and variables.

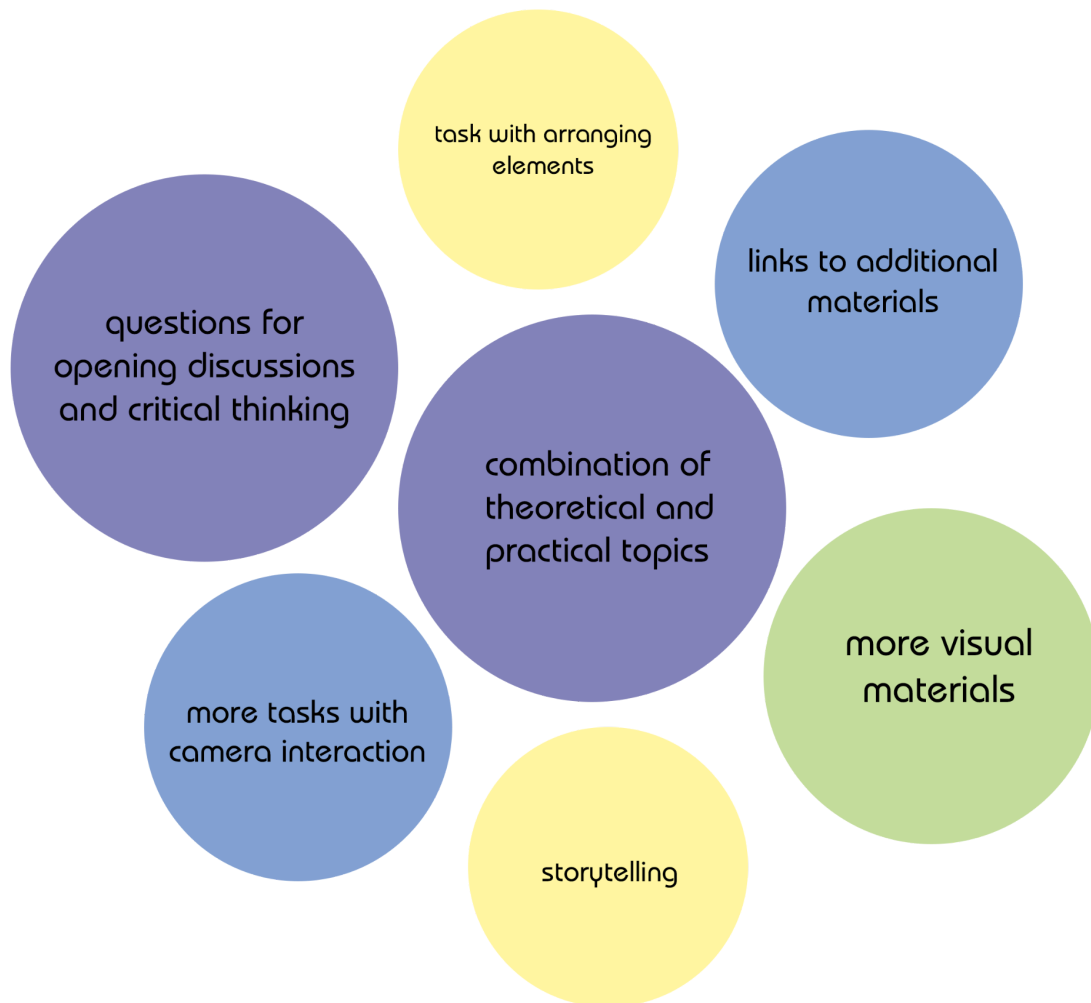
The next step was to research the curricula of Art History courses and find the most suitable topic for the story. The interviews showed that art history courses are the most demanding and have more issues with overall engagement. The data from the interviews also showed that, out of three different examples of the walks, the first (Figure 14) and the third (Figure 16) were the most popular among educators. It was also noted that the third walk (Figure 16) might have more educational value and less subjective materials. After the research, a topic of composition in the Renaissance era was established as the one to be developed, combining the first example of the more practical approach and objectives with the theoretical-oriented art history walk.

After establishing the topic and storyline – *The Lost Muses of Harmony: Composition in Renaissance* – a list of ten objectives was created and aligned to the type of tasks that can be designed for the final prototype. It is essential to emphasise that since the testing of the prototype was one of the main aims of this study, the types of interaction were chosen based on available tools of prototyping in the Protopie application. Activities involving image recognition or touch screen responses, like highlighting the elements, were changed to other tasks that could be implemented for testing in Protopie.

The following step was to write a script of the application with all images, buttons, texts, titles, sounds, locations, links and descriptions of the tasks. At the same time, the storyline was written and edited to align with the objectives. The final story is about a young artist in crisis who is trying to find the Muses of Harmony. Each Muse represented one of the objectives and introduced information and tasks. The users had to follow the main character to collect the points that could be used at the end to gain access to another walk, which was added to the prototype as a suggestion from three educators during the first interviews. Based on other suggestions, the questions that could serve as an opening for discussions during the class and links to additional materials were added to the final script and design. Figure 17 shows all the changes made based on the interviews; the most suggested improvements were questions for opening discussions and critical thinking, alongside a combination of theoretical and practical topics. The most controversial and least mentioned improvements were storytelling and a task with arranging elements.

Figure 17

Prototype improvement based on participants' suggestions



After finishing the script, we moved to designing and creating all interactions in Protopie. Even though the software promises compatibility with Figma, we found that, after transferring the project, most of the elements were not aligned as they were in Figma. Considering the required number of adjustments and the changes that were already planned after the interviews, we opted to redesign the entirety of the prototype – including graphics, text boxes, and buttons – in Protopie.

During the active prototyping and testing of the walking route, three topics were removed (lines, scale and proportions, windows and light), as they presented redundant information and did not align with the final storyline; it also ensured that the walk was not too long. Hence, the final walk included seven topics: art and architecture, introduction to composition, balance, rhythm, symmetry, perspective, and pyramidal composition (Table 3). Each topic had assigned tasks or activities with

storyline screens, instructions, learning materials and additional materials. Table 3 also shows the type of task and objectives for each topic.

Table 3

Topics, tasks and objectives

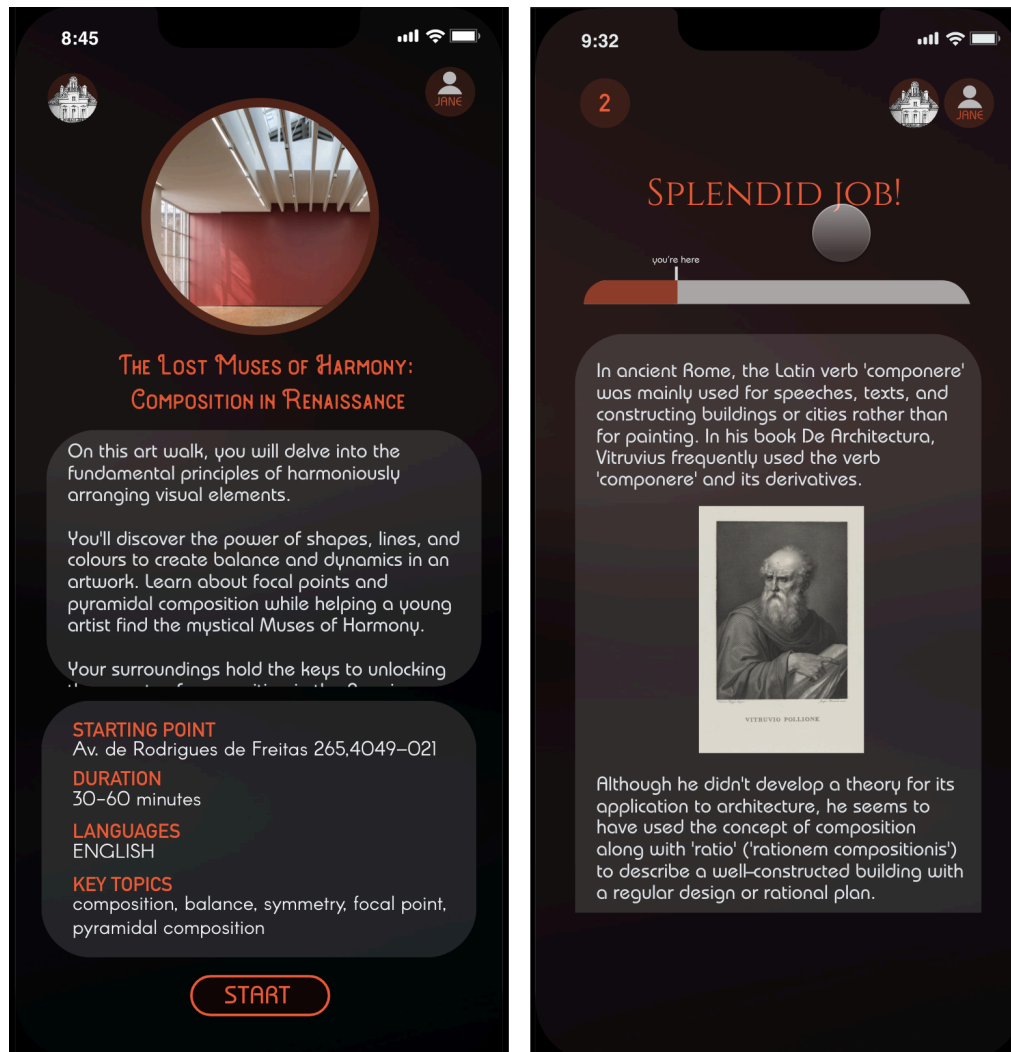
Point	Tasks	Objectives
Art and Architecture	Puzzle	Framing, artisans of Renaissance, the connection between Art and Architecture
Introduction to Composition	Finding elements and taking their pictures, then arranging the elements in a frame	Framing, arranging elements, history of Composition, critical thinking, looking for details
Balance	Aligning shapes with composition while taking pictures	Balance, critical observation, arranging elements, bilateral symmetry, asymmetry, 2D and 3D vision, balance in Renaissance artworks, dynamic composition
Rhythm	Detecting and choosing patterns	Rhythm, rhythm in Renaissance artworks, looking for details, geometry in Renaissance artworks, dynamic composition, floors in Renaissance artworks
Symmetry	Finding objects, aligning the image with real objects and taking pictures	Bilateral symmetry, asymmetry, symmetry in Renaissance artworks, proportions, concept of golden ratio, critical thinking, critical observation
Perspective	Looking for vanishing points and opening images with perspective lines	Linear perspective, vanishing point, perspective in Renaissance artworks, critical thinking
Pyramidal Composition	Looking for triangles and counting them	Pyramidal composition, composition in Renaissance artworks, matter of religion in Renaissance artworks, dynamic composition, critical observation

For better navigation, the option of a video tour was added to the home screen and an animation that indicated scrolling was added. Also, the fonts' colour, types and sizes for all texts and buttons were changed to make them more readable and visible when used outside (Figure 18). Finally, a feature was

added wherein clicking on the paintings presented them in a larger view along with information of the work's title, artist, and year.

Figure 18

Interfaces of walk info and learning material for Introduction to Composition screens before the testing phase



The first mock-ups and the final script included two options for the walk: following a linear storyline by tapping the 'Continue' button or a nodal storyline where users choose where they want to go by tapping highlighted words or phrases. Words like 'balance', 'perspective', or 'rhythm' lead to the point where a user explores the chosen topic. It was essential that instead of the map or the list of the places, a user should select the critical objectives to ensure the narrative was controlled, and the main storyline was kept coherent. It also kept the user's attention in the story. The places between routes, alongside those on the walk from one point to another, were also taken into consideration. For example, after learning about symmetry, a user would walk on a street with many bright tiles with symmetrical designs. The nodal narrative was a significant element in creating a sense of cooperation

and gamification. It could also benefit collective walks, where few students explore different routes by their own choices.

The nodal storyline was implemented using conditions and variables in Protopie (e.g., if a user chooses A, action B happens). Unfortunately, during pre-testing, the application crashed continuously in the middle of the journey; considering the limited time, it was not possible to fix it in time for the final testing sessions. The final version of the prototype followed a linear storyline.

To make the story more visually appealing, AI-generated images were created for each character and for the final painting of a young artist. These images were later edited into the frames to create a more cohesive visual environment. Each topic also included pictures of all paintings, sculptures, and essential figures mentioned. Appendix A includes examples of designed screens at this phase of development.

4.3 Improvements

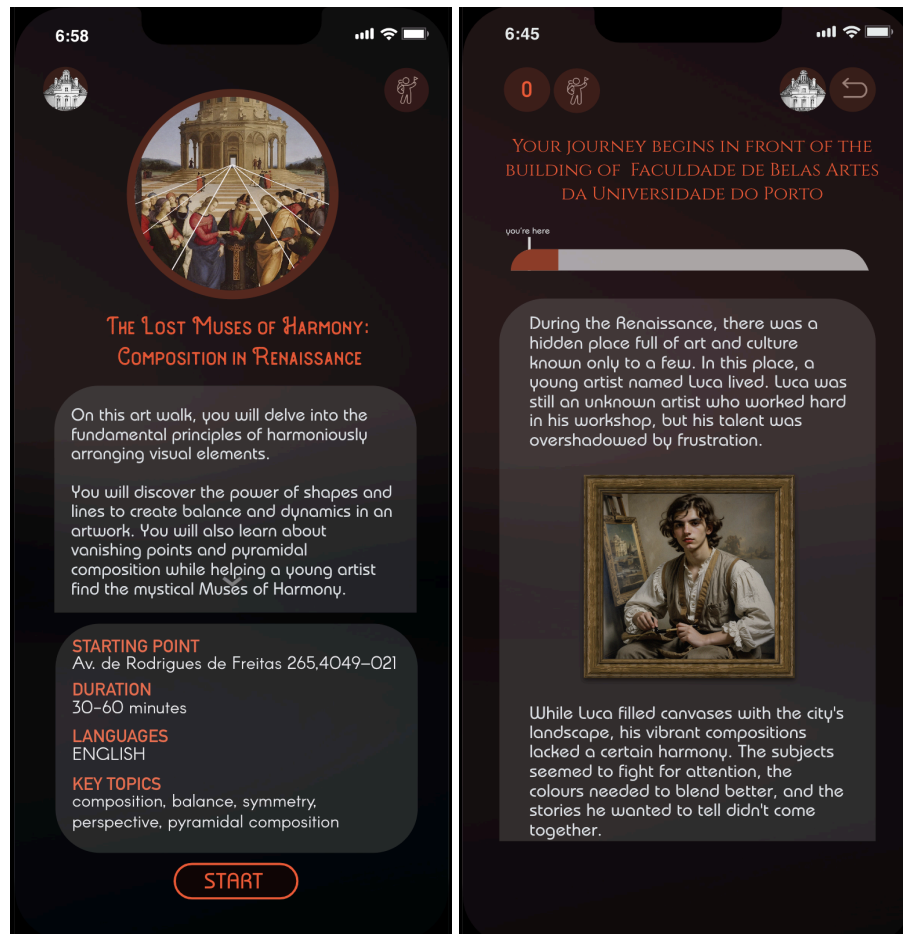
After the first three tests, several significant changes were made to the prototype to improve user experience and functionality. One key update was enabling the map to open by tapping on the image, making it more intuitive and accessible. Additionally, the route was adjusted and made shorter and more intuitive, as the order of the topics was adjusted: ‘perspective’ was swapped with ‘rhythm’.

A back button was added to the right corner to enhance navigation, allowing users to return to the previous screen quickly. An option to watch navigation during the tour was also introduced, providing continuous guidance throughout the experience. The button for the navigation was placed to the left corner along with the score icon (Figure 19).

The touch area was expanded to improve usability, making interactions more reliable and user-friendly. The personal icon was deleted from all screens except for the homepage in order to simplify the interface and reduce clutter. Finally, a navigation animation was implemented when opening image boxes with the titles and basic information, adding a dynamic visual element that improved the overall engagement and aesthetic appeal of the prototype.

Figure 19

Interfaces of the improved version of a prototype



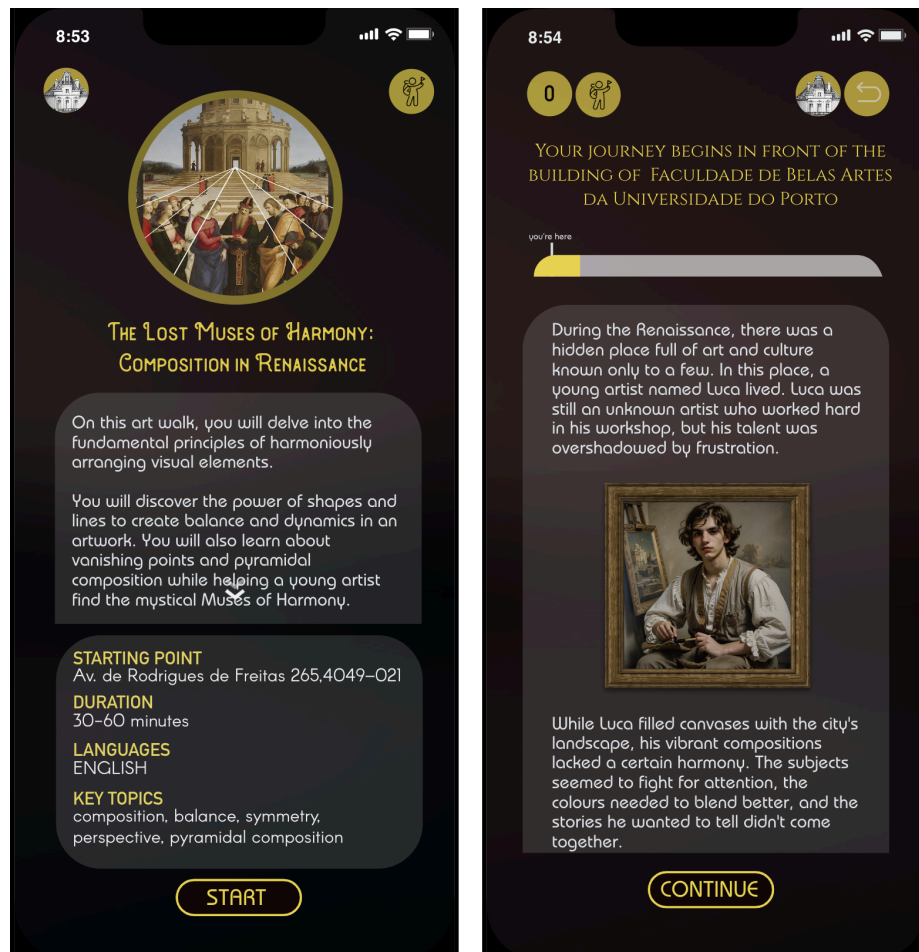
The final improvements were made after all tests and were based on a combination of participants' suggestions and data from think-aloud protocols. There were seven most essential improvements.

1. *Colour Scheme*

We have revamped the prototype's colour scheme to create a more visually appealing and user-friendly interface. The new palette is designed to be more functional than the original combination of black and red. To ensure that elements are easily distinguishable and accessible to users with various visual impairments, the colour scheme was changed to black and yellow, the highest visual contrast pair (Figure 20). This selection of colours aims to enhance the overall user experience by improving visibility and increasing engagement in outdoor settings.

Figure 20

Interfaces of walk info and the walk's starting point in the prototype's final version after the testing phase



2. Clearer Written Instructions

Participants (n = 8) feedback highlighted the need for more straightforward and concise instructions. We revised the instructional text to be more precise and more intuitive (Figure 21). By simplifying the language and breaking down the steps into manageable segments, users will find it easier to understand and follow the instructions.

3. Touch Instructions

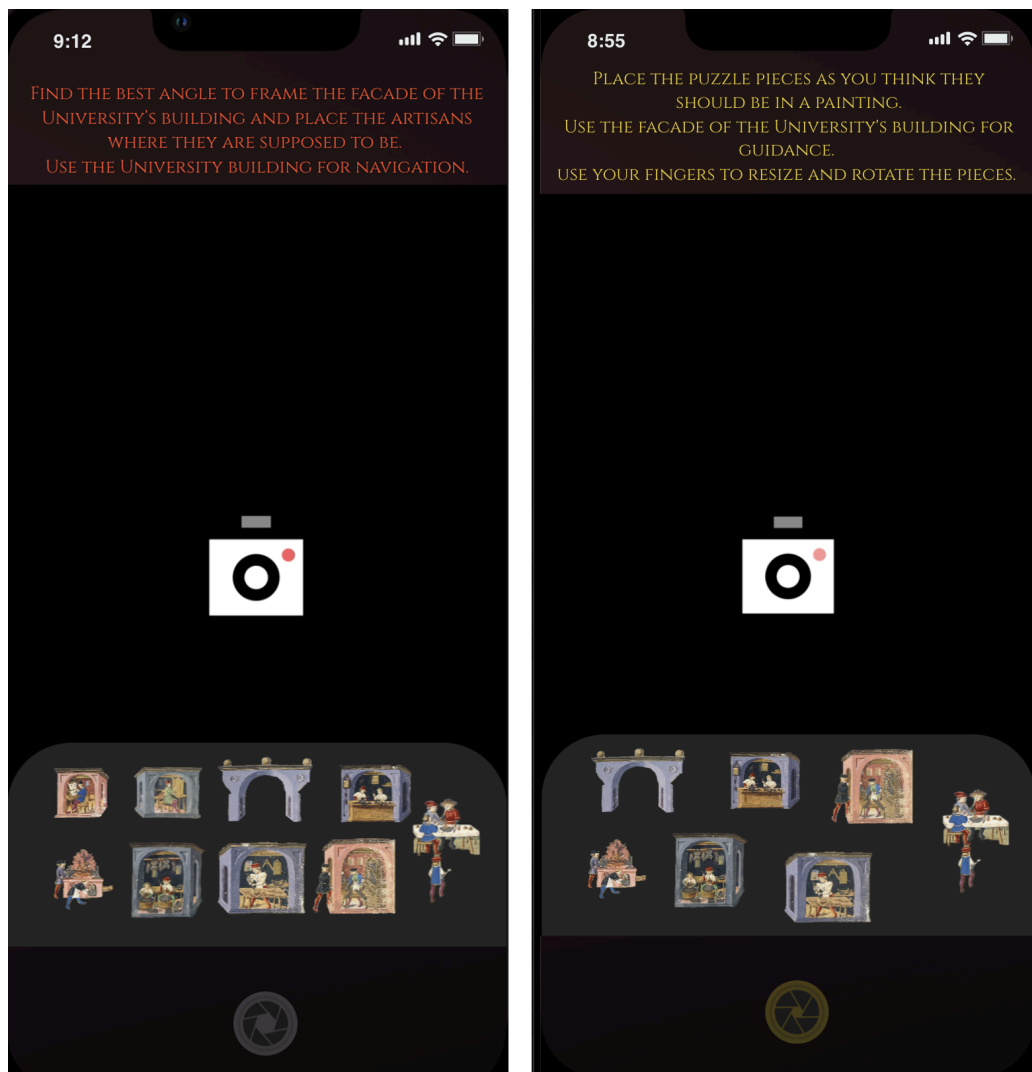
We have incorporated animated instructions on several screens to open bigger images in the texts. The testing showed that participants (n = 7) frequently missed that opportunity without our guidelines. The animation visually demonstrates the essential gestures, making it easier for users to grasp the interaction mechanics quickly. It was necessary to better guide users through the touch interactions required in the prototype so as not to miss the learning content.

4. Adjusted Number of Puzzle Pieces in the First Task

Based on participants' feedback ($n = 10$), we have adjusted the difficulty of the initial puzzle task by reducing the number of pieces (Figure 21). This change is intended to help users acclimate to the puzzle mechanics without feeling overwhelmed. It also made interacting with the building's facade more logical and allowed the goal to be achieved faster.

Figure 21

Interfaces of the First Task before the final improvements and after the testing phase improvements



5. Language Refinement

The testing showed that most participants ($n = 11$) had difficulties understanding the meaning of "swirl" in the second task. To improve clarity and precision in our language, we have replaced the term with 'spiral.' This ensures that the instructions and descriptions are more accurate and understandable, reducing potential confusion for users.

6. AI Images to Paintings of Muses

Some participants (n = 6) mentioned that the AI images were too modern and distracted from the Renaissance narrative, which affected the immersiveness of the experiment. Even though the AI images were only temporary solutions on the prototype, it was decided that the existing paintings of Muses would serve better than any modern images created for future development (Figure 22). The use of classical artwork adds a layer of depth and authenticity that resonates with the overall concept.

Figure 22

Interfaces of Meeting with the Calliope before the final improvements and after the testing phase improvements



7. Notes Page with PDF Download Option

Some participants (n = 5) highlighted the issue of long texts and the difficulty of reading them thoroughly and paying attention while being outside. We have added a notes page feature to facilitate better user interaction and information retention. Now, users can download notes as a PDF with all learning materials and links.



These improvements collectively enhance the prototype's usability, visual appeal, and educational value. These changes will provide all users with a more engaging and satisfying experience. To explore the prototype further, please refer to Appendix B. For the user journey that illustrates the interaction map of the prototype, go to Appendix C.

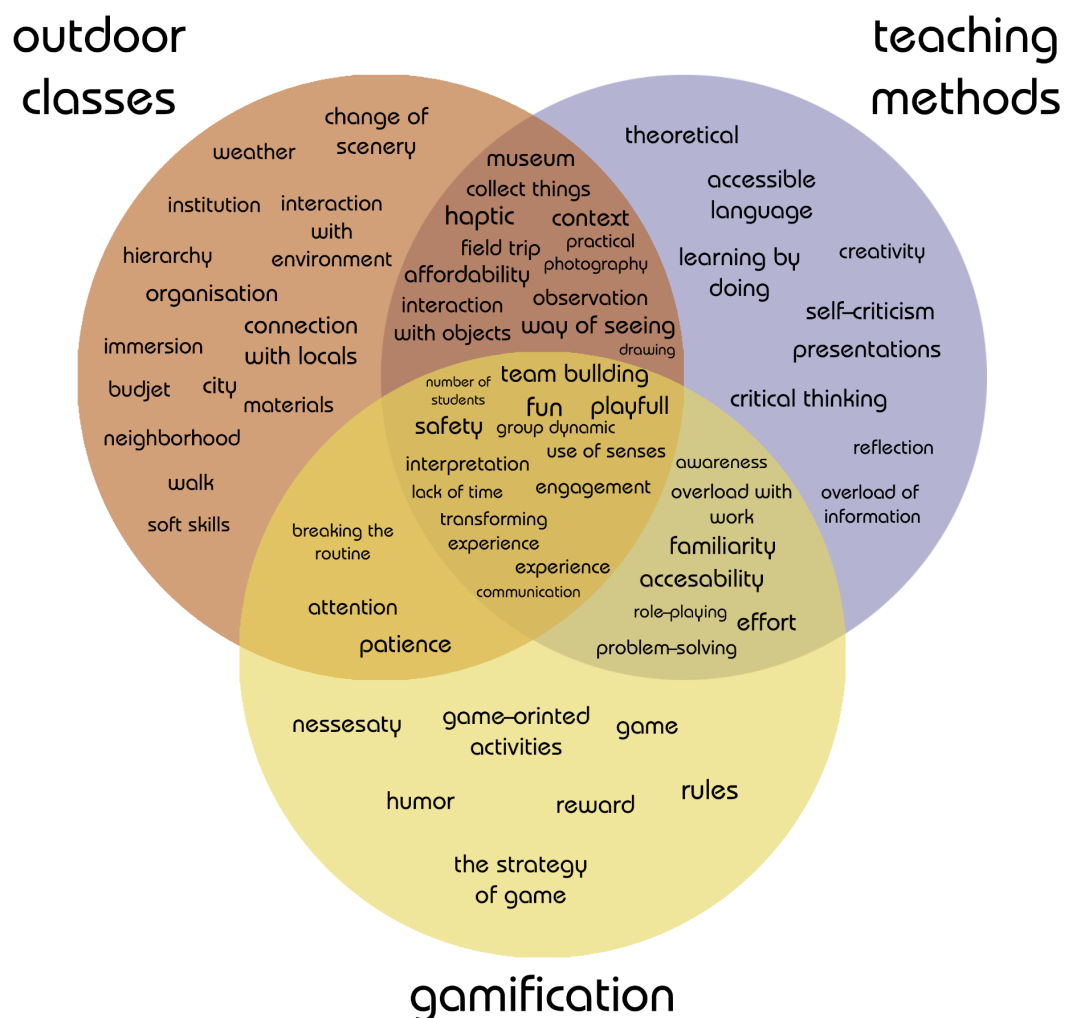
5. Results

5.1 Introduction

This chapter focuses on the interconnectedness of the results collected from interviews, tests and literature review. Four main topics have emerged from the data, providing detailed insights into integrating location-based mobile applications into educational practice for Art and Culture courses. These topics include the challenges of new teaching methods and tools, awareness and affordability, the significance of engagement, critical thinking, communication, cultural and historical background, and visual tools for transformative learning. Figure 23 illustrates the connections between the main topics and the words and concepts frequently utilised by the participants.

Figure 23

Words and concepts that were mentioned in the interviews and tests in connection with outdoor classes, teaching methods and gamification



5.2 Awareness and Accessibility of New Teaching Methods, Gamified Learning, Digital Tools and Software for Learning Purposes

A key finding of this study is participants' lack of awareness of gamification in education in general and gamified teaching methods in particular. Moreover, half of the participants were unsure about the definition of gamification, and only after further explanation did they connect gamification to game mechanics or playful activities. A few respondents ($n = 3$) tried to determine whether they had used or considered gamification. Educator A, who teaches practical courses at Fine Arts faculty, admitted:

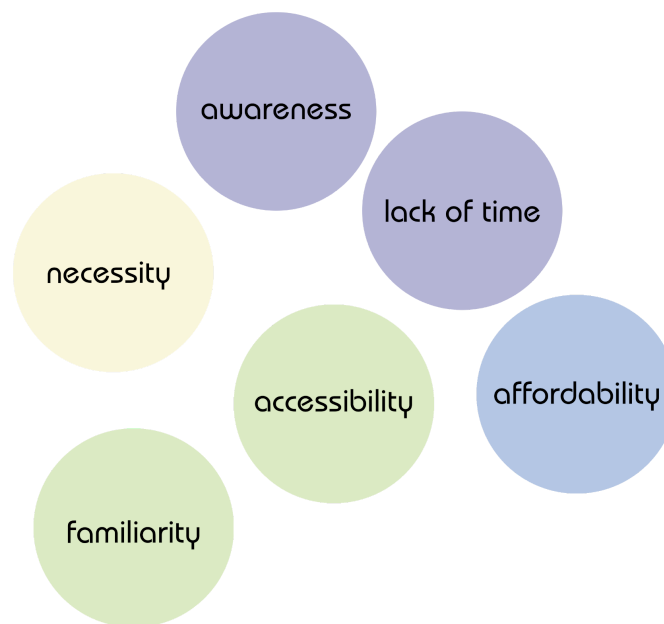
*I never thought about the possibility of there being games for this area. I think watching videos is enough to learn. But I've also never been **challenged to think differently** until you. And now, I feel challenged to show content in a different way. Or **to test knowledge outside of the box**.*

The consistency of responses across participants suggests that doubts about the concept of gamification and its applicability in education might be a common tendency in the formal education system. After discussing gamification and examples of gamified software that can be useful for active learning or assessment, alongside methods like role-playing and storytelling, most participants ($n = 6$) considered learning more about similar teaching methods and tools.

Moreover, the study identified a list of barriers to implementing new methods and tools. Figure 24 presents the challenges that educators faced, impacting their ability to incorporate new teaching methods and tools into their courses.

Figure 24

The challenges for incorporating new teaching methods



It is interesting to note that, several months after the first interviews, two participants reported having used gamification in their classes. They were surprised by students' positive feedback and enhanced engagement during the class. After our interviews and prototype testing, most respondents ($n = 6$) expressed their plans to implement new teaching methods, including gamification, educational mobile applications, or additional software for learning. All student participants ($n = 7$) also positively reacted to new learning tools. Most ($n = 5$) admitted that they had never considered the possibility of interactive applications that can assist in learning theories. Moreover, all testing phase participants, both students and educators ($n = 12$), confirmed that all tasks and text materials taught them something new about art history and composition.

However, two educators also pointed out that they considered gamification less necessary in adult education than in secondary school. Indeed, this view is aligned with existing literature, which indicates that most gamification research focused on younger audiences (Ballagas et al., 2007; Koutromanos & Styliaras, 2015; Klefodimos et al., 2023). Educator B expressed, *"If I were teaching probably in secondary school, it would make more sense to apply some techniques. But here they're **adults**"*, which aligns with Educator E's reflection on the use of gamification in university education:

*It seems to me that **adult people should train themselves to have some kind of perseverance and generally take this seriously. Therefore, yes, probably yes, but I want this gamification to be some kind of smart or something, or **focused on them expanding their knowledge in the subject** so that***

they can, well, in such a straight good academic way, so that they know something and can do it in the future, apply it somehow.

Nonetheless, one of these educators who expressed scepticism about gamification a tool for adult education admitted, after testing the prototype, that similar applications could be helpful:

*It [prototype] works. It could be in other cities. It could be technical stuff. I'm imagining something from painting and sculpture. You know, if you want people from the fine arts to play your game. It could be, like, **the process of doing things.***

The study showed that well-balanced entertainment and education in applications can be valuable learning tools. The testing showed that the designed prototype integrated the game mechanics and educational materials in a way that kept the experience playful and academic. The difficulties of implementing game mechanics that support the learning objectives and not only appear as a tool for interaction were articulated by Educator H: *"It's clear that you understand the topic well, but its transformation into a game task is also very high-quality because it happens that **the balance of game mechanics and tasks** fails."* Haugstvedt and Krogstie (2012) also addressed the balance between fun and usefulness as one of the key goals for developing gamified educational software.

Part of the educators (n = 4) were familiar with the theoretical principles of gamification. They provided examples of various activities they used in their teaching methods, such as role-playing, quest-like field trips, storytelling, problem-solving and competition with group goals and rules. Educator F utilised the *dérive* method, a playful technique for exploring cities without the typical motivations for movement (Idioticon—Drifting, n.d.). The *dérive* is a research method developed by the Situationist International. It involves intentionally exploring an urban environment to encounter new experiences through aimless wandering. The practice comes from psychogeography, a field that explores the influence of the environment on the human body (Lagomasino,2020).

Educator D mentioned, *"I use the **strategy of games**, and they get to have characters, and they get to have a role in it. But they don't get **rewards** out of it or something."*

Storytelling has been shown to be the most controversial method. Only one educator applied it to their courses. At the same time, some educators (n = 3) who admitted to have limited knowledge about gamification noted that it could be a compelling method they would consider. While some educators (n = 2) in the testing phase admitted that the storyline incorporated into the prototype seemed unnecessary, others (n = 3) were impressed by the additional narrative. The main reasons why storytelling was revealed to be unsuccessful were not the story itself but the fact that the prototype already have enough gamified mechanics (n = 2) and that the prototype's structure is not compatible with other more immersive storytelling tools (n = 1). In the words of Educator H:

*To be honest, I would not put much emphasis on storytelling. Storytelling through such an application is difficult to deliver, and **the competitiveness of different storytelling sources** is very high. The real teacher is much better than any application. But **teaching you to look differently through the app, through staying in places, is a really cool topic.***

Our study's outcomes contradict several studies on interactive digital tools (Bellotti et al., 2003; O'Connor et al., 2020; Kleftodimos et al., 2023) that expressed storytelling as a valuable tool for engaging educational content. At the same time, Kleftodimos and colleagues (2023), who created two different applications about cultural heritage, admitted that in their project, the more educational applications had better responses than the ones with storytelling.

The results also suggest that the unconscious application of game-oriented teaching methods exists in education. However, educators tend to reflect more on their teaching methods only when challenged to do so or when they are exposed to new tools. In the words of Educator C:

*It's kind of difficult, but sometimes, most of my exercises, at least in architecture, in painting studies or film studies, are not very consciously, but I guess **unconsciously, game-oriented**. I use a lot of **role-playing strategies** because it's a very good way **to engage with the periods or with an image** and for teaching narrative in painting or film.*

It is worth mentioning that educators who were aware of gamification methods also admitted (n = 3) to not using them frequently. That perhaps can be related to the issues of affordability and accessibility (time, familiarity, necessity, location).

The data indicates that working conditions at the universities contribute to a lack of initiative in learning new methods or tools and experimenting with applying them. Participants frequently expressed (n = 6) that they do not have enough time to search for new methods or tools due to work overload, such as administration, research, publishing, and reporting. It is important to note that educators who are also practising artists struggle to balance teaching and personal responsibilities, leaving them with limited time for studying and utilising new tools. According to Educator A:

*Especially full-time professors here, **they don't have a lot of time**. To research and change anything. They are just **overloaded with a lot of work**. The problem is when you are full-time, you need classes, you need to do research, and you need to be an artist. Three categories. It's a lot.*

At the same time, Educator B noted, "So I think with all this **demanding pressure** we get from the university and from the career, we end up like... Well, I know my younger colleagues, they have more **initiative**."

Time is of the essence not only because it is limited for studying and incorporating new methods, tools, or software but also because of the plethora of information that educators must incorporate into their courses. That will be further explored in the section about engagement, critical thinking, context and communication in theoretical and practical classes.

The analysis also reveals the connection between adopting gamification tools and methods and the time necessary to learn new software. Educator E recalled a mobile educational game:

*There is some kind of **game**. Instagram periodically slips it to me, like, who is the artist? It seems to me that it is a super cool tool so that they [students] can also know that they do tasks, determine which of the paintings belongs to what period, or who the artist is of this painting. This is, in general, very cool, and this, by the way, is a very good thing that **trains them [students] to watch** because they should know the periods, understand the artists, and see their work many times so then they answer it faster.*

Nevertheless, when Educator E was asked about the reason they did not try to use this tool, they said:

*Maybe because I don't know them? That's probably why. I just barely remembered the app. By the way, I do not know if they have **functionality** or whether I can **design my test** inside the application. It seems to me that it is rather easier for me to select works from my saved folders with collections, to do the same in Google form. That's enough.*

That raised the question about the necessity of additional software and its use for art and cultural education. However, at the same time, most educators (n = 5) revealed in their interviews that there is a demand for tools that would be more convenient than what they use now, in particular for assessment and for more engaging ways of presenting complex theories. This aligns with the research on game mechanics, particularly the study by Tagie et al. (2022), who introduced innovative teaching approaches to help students remember art history.

While only two participants expressed indecision to use additional software, the other interviewed educators (n = 6) were open to using new tools and experimenting with teaching methods if they were accessible, affordable, and aligned with their educational goals. Table 4 shows the variety of software and tools for classes that participants mentioned in the interviews. The most prevalent software among educators is Google Docs, Google Arts & Culture, and Miro. They were all mentioned as tools for collaborative work and visualisation. The additional digital tool mentioned in most cases is the smartphone camera. The use of photography for educational purposes will be covered in the section Visual Tools for Transformative Learning.

Table 4

Software and Digital Tools that educators use for the classes

Educators	Software	Digital Tools
Educator A	Google Docs, Google Arts & Culture	-
Educator B	Google Docs	phone (camera), window grid
Educator C	Google Earth, Google Arts & Culture, 3D model simulations, Youtube, Cinematic Digital	tablet, phone (camera)
Educator D	Miro, audio walk application	phone (camera), phone (sound recording)
Educator F	<i>were not discussed</i>	phone (camera)
Educator E	Google Docs, Google Arts & Culture, Miro	phone (camera)
Educator G	Google Docs, gyroscope application, Figma Jam, Touch Designer	VR tools, web-camera
Educator H	Google Docs, Zoom, Notion, Miro, Slack	-

During the testing phase, most educators (n = 4) confirmed they would be willing to use an app resembling the prototype, particularly if the content aligned with their course materials. Additionally, two educators were prepared to implement the already-developed Renaissance and Composition walk with their first or second-year students.

That directs us to gamified digital tools that can be added to the main courses instead of rebuilding the curriculum for gamified classes, which is time-consuming and has many controversial outcomes. The results of the prototype tests suggested that these types of tools are ideal for additional outside activities (either individual or collective) as well as homework, which gives educators new starting points for class discussions. The following sections will address the significance of dialogues with students and educators' current issues with engagement.

The educators also stressed the significance of having adequate nearby locations for any outdoor practice, which will be further explored in the next section. However, it is essential to mention it here as one of the reasons for the hesitation in using new digital tools that require outside activities.



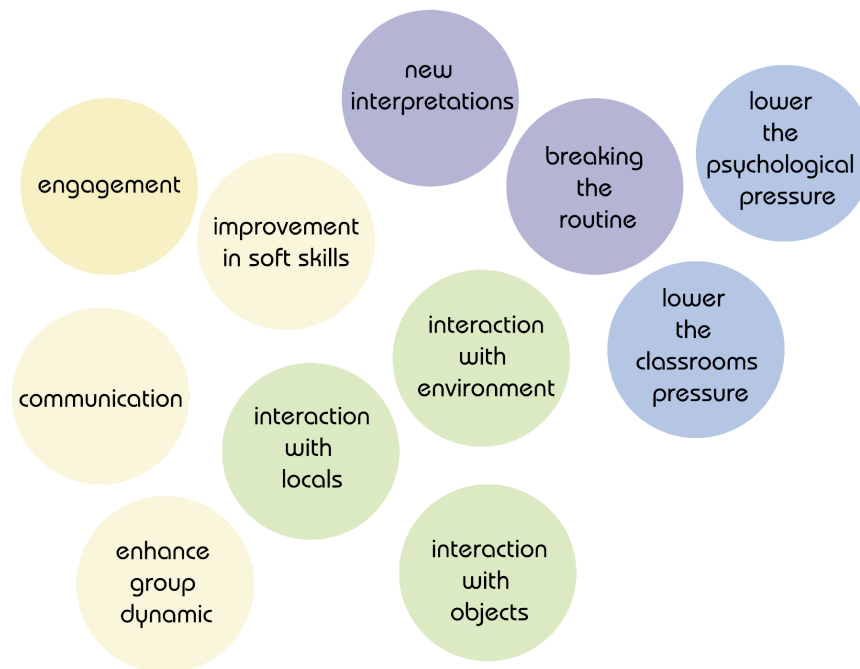
Overall, the data emphasises the importance of awareness of new tools and teaching methods. It also highlights the limitations that formal Art and Cultural education face due to time constraints and an overload of information. It is essential to thoughtfully apply new methods with a good balance of playful elements and appropriate teaching materials.

5.3 Outdoor Learning, Field Trips and Interaction with a City for Engaging Education

A common theme emerged from the data: field trips and outdoor classes help educators achieve a more engaging class participation. This is consistent with the literature on outdoor learning and its benefits for creativity (Hindmarsh & Hunt, 2020), engagement, new interpretations, and class dynamics (Moffat & McKim, 2015). Figure 25 illustrates the benefits mentioned by educators during their interviews.

Figure 25

Words and concepts that were mentioned in the interviews and tests in connection with outdoor classes, teaching methods and gamification



All educators (n = 8) noted that activities outside of the usual classrooms have a positive impact on communication between students and educators. Three respondents specified that field trips allow students to connect with others and enhance their soft skills. Educator C highlighted this with:

*Our field trips have this advantage on **soft and transferable skills** because, well, because we have this course on the museum and it is a course with students from all over the university, not only history of art students or humanities students, but medicine students, engineering students, and they will have to deal with each other, with each other's **interpretation**, and it is a course for soft and transferable skills.*

The study also showed that educators also value interaction with objects of study on field trips (n = 8). Educator C shared, “One of the opportunities of field trips is that **team building** aspect and **engagement with heritage** because we are really stepping, literally stepping on the work.”

Four other educators' teaching experiences supported that statement. Other respondents also noted the importance of fun, breaking the routine, and changing the scenery to make classes more effective by bringing students outside. A quote from Educator F captures that sentiment:

*I also feel that some concepts and theories and things that we teach we can also show through outdoor activity or in the city, showing examples or stuff. And I also think it provides a way, it's **fun, which I feel is important in teaching**. It also **breaks the routine** of being seated in the same room all day long.*

The results mirror those of Moffat and McKim (2015), who argued that changes in the learning environment leads to new educational experiences and the obtaining of different knowledge, breaking the established hierarchy of traditional classrooms. These findings were also supported by the results of the prototype tests, where educators (n = 5) emphasised that those types of applications will be very effective for engaging in group activities outside of the classroom, giving both theoretical and practical knowledge that students can experience in urban environments. Students (n = 5) also wanted to try the application in the collective walk and compare their experiences. Even though three of the students struggled with long texts, most participants (n = 6) agreed that this is a fun and easy way to study complex theories and practise them simultaneously. One of the students' opinions on that summarises the overall issue with the texts:

It was kind of difficult after the first few tasks, in the middle of them, I started skipping the texts because they were too long, and I wanted to keep going. Maybe it's better to make them shorter or make like notes at the end.

This also aligns with the experience of one of the educators who was concerned about the length of the walk and the volume of text. It's important to note that all tests (n = 4) took place during the day in late spring, and the heat during those hours could have affected the overall experience. The factor of weather that influences outdoor classes will be addressed later in the section.

Participants (n = 5) consistently expressed that connection with material objects and haptic sensation during the learning process is an essential advantage of field trips and outdoor learning that helps students absorb information differently. Educator H, who teaches primarily practical classes, stated:

*When we're outdoors, we get to **experience materials in their natural context**...it grounds us in the materiality of the world, I think, and it also enriches our **sensory** experiences. I want my students to be more adaptable and **observant**, and it helps.*

Along with interaction with objects and materials, it was suggested that field trips give students the opportunity to interact with locals. As Educator C stated, "*We tend to do a lot of field trips and outdoor activities because we can **engage with the objects and locals**.*" Another participant also

addressed social engagement and the social role of art, asking their students to observe crosswalks and how people behave while crossing the street. In describing their perspective, Educator D said:

*The first part was to **observe**, of course. And then it was to interview. And so they had to **observe people** crossing the street. And this became something much bigger than crossing the street very quickly. Because you would find styles and... They would stay. I stayed for... I was supposed to stay like 10 minutes. I stayed for two hours observing people. Because it's really fun to observe people. And their behaviour and the way they are **interacting with other people**. With the red light and the green light...this observation and then the interview really get them out of the shell. Because the second part was that they would have to observe. But they would have to pick two or three persons and interview them. Small things. "Did you realise how to cross the street?" "Why did you do that?" And they found this **exploratory and observational**, which is basic. But they never do it in such a **systematised way**. So they had things they had to observe. They have an observation ship that they built together. And then they had **to talk about it**. And it was so, so much **fun**. Because it suddenly became something very different. The crosswalks are not important anymore. We were just discussing people.*

Unexpectedly, the data revealed that the interconnectedness of interaction with people, observation, and further analysis during group discussions showed that it is one of the most beneficial teaching methods for outdoor classes. Observation as a central task during field trips or any other outdoor activities came up in most of the interviews (n = 6), and it is evident that this task cannot be incorporated into the classroom setting. In the words of one participant about the benefits of outside classes: "*The main one [benefit] is to be in the world; I mean, **the world is not inside the classroom**".*

The experiences of the participants support Şimşek et al. (2013) regarding the importance of establishing connections between city residents. Furthermore, it aligns with the work of Dahlgren and Szczepanski (1998) on outdoor learning, which enhances the interaction between emotions, actions, and thoughts during observation.

Even though most of the educators spoke positively about going outdoors with students, one of the most favoured field trip activities is not city walking, but classes or tours in museums. Most participants (n = 5) mentioned trips to museums as one of their methods for engaging outdoor classes and taking advantage of learning new spaces:

*I take my students to **museums**, and I provide classes in the museum. Sometimes they have to talk about the pictures, sometimes I talk about the museum **space**, the **organisation** of the museum, the **transformations of the building**, it was not a museum, and it was adapted to a museum.*

The findings provide empirical support for the literature analysis that showed that gamification in cultural studies focuses more on museum programs (Madsen, 2020) than on implementing new tools in formal education or facilitating outdoor learning. Even though the prototype testing showed that interaction with a city was well implemented and that most participants ($n = 9$) were optimistic about incorporating such tools in educational settings, museums also appeared in the responses ($n = 3$) as an additional setting for applying similar tools.

The study showed that sometimes museums serve as educational playgrounds. One of the educators adjusted the regular museum trip with a playful activity. They asked their students to take selfies with paintings from a particular period, which made the task surprisingly engaging for students and led them to spend more time in a museum. These findings correspond with the experience of another educator who stated the negative side of taking pictures in museums. However, the engaging factor when students took selfies with the works was still highlighted:

*I had an awful experience in Lisbon when we took students to an art museum and they were always **photographing** the works. And I lost my temper, and I said, stop photographing. Look, look, think that an earthquake or a fire will tear all those things. You don't have to photograph, you have internet. It was 15 years ago, so the internet was not so rich, but it was very rich. And they were always photographing, trying to capture. Well, they were all over the place. And sometimes they were, because it was a trend back then, making selfies with the poses, with the pictures. Well, I was less cautious with that because at least they **engaged with the work**. But when they were recording the work, then when they were picturing, why?*

The findings indicate that museums are the easier choice for organising outdoor classes, possibly due to educators' challenges during field trips. One issue is the noise that interferes. Educator C's observation was: "Well, the campus, it's kind of difficult because of the **noise**, and even though we have a beautiful campus here with a lot of grass, acoustically, it is challenging." Maheran et al. (2017) addressed similar issues of an inconvenient campus environment that limits educators' opportunities to bring students outside the traditional classrooms.

Another problem mentioned three times during the interviews is the weather, which sometimes impacts the class dynamic. Because of the weather, it is also difficult to schedule and organise such trips. As one interviewee described: "This kind of **logistical matters** can be a challenge. Doing it on a day that's not **raining**, or not raining so much, I had that problem after the day; I had to postpone it two weeks".

Indeed, it was mentioned that the weather might impact testing results. Paying attention to the learning materials was difficult for some participants ($n = 4$) because of the heat and the direct sunlight. Participants ($n = 5$) suggested considering the availability of shaded places on the route to

make it easier to interact with the application. The visibility issue during the day that affected the testing (n = 9) was addressed in the Prototype chapter.

Geographical accessibility is also essential for organising any activity outside of universities because of the time limit of the classes. Most educators (n = 5) noted that they try to utilise places near their campuses so that the journey will not take much from the class. One of the educators also mentioned the importance of learning our neighbourhoods:

*I think it is really important, that we resituate ourselves in our neighbourhood. So the city has that, you can have people having totally **different experiences**, their experiences, in different neighbourhoods, and, of course, even in the same neighbourhood, I can have a different experience from you. But, to get them to, and I think, that already happened a little bit, during the pandemics, because we could only walk around the block, around your house, or something. So you get to **discover new things** around you, but that has to be, in my opinion, a deep learning of your city, around you, so, of course, if you do it in a group, or in a class, you get other results, which is also **fun**.*

The testing results also showed that walking around familiar surroundings with the purpose and a digital tool for looking differently at the frequently visited places made the participants (n = 9) change their perspective on ordinary things and see the environment with a new vision.

Safety was mentioned as another challenging aspect (n=3). One of the educators who organised city walks for students was particularly worried: *"I warned them at least twice to please pay **attention** when crossing the roads... I think that I was worried that in the **enthusiasm** of the game, they would not be paying attention."*

The literature review emphasised the safety issue (Tonucci & Rissotto, 2001) but also noted that safety was inadequately addressed in existing projects related to digital tools for outdoor learning. The testing sessions confirmed that safety is an important aspect that is difficult to incorporate into the application. During the testing, participants (n = 6) caught themselves so engaged in the activity that they overlooked car and road obstacles. Additional safety instructions that might affect users' awareness of their surroundings were discussed in the Prototype section but were not tested.

Finally, the affordability of any field trips is an issue that half of the educators mentioned. Educator H highlighted this with:

*With the wars and the economy, even a field trip to a sometimes very near location, it's very, very **expensive** for fifty students, to take fifty students we pay the same that we pay to take one hundred, so it has become more challenging for us because we have to articulate very, very tightly with our **budget**.*



To summarise, the study showed that field trips and outdoor classes bring many advantages to learning Art and Culture. However, to make them an essential part of the curriculum, educators must contact university officials and get organisational and financial support from them. The study revealed that it is possible to facilitate classes on campus grounds, but the environment should be more friendly to class activities. Nonetheless, the city environment too remains challenging for group activities. Still, it can serve as a learning space for small groups or individual activities that provoke and motivate further group discussions and engaging classes with the help of digital tools.

5.4 Engagement, Critical Thinking, Context and Communication in Theoretical and Practical Classes

The key unpredicted finding of this study is the consistent differences between theoretical and practical classes that were emphasised by all educators (n = 8). First, most respondents (n = 6) mentioned that students' engagement in the theoretical courses or theoretical sections in the combined courses is much lower than in the practical classes, such as seminars or workshops. In the words of Educator A, "*In **theoretical classes**, we do not speak much, and we do not talk to each other, and we do not **educate**.*", as opposed to the practical classes where most educators (n = 7) do not express the same concerns about the lack of engagement.

The findings indicate that educators tend to move toward more active classes, even in theoretical courses. Thus, half of the educators (n = 4) who teach art history or cultural studies courses combine the lectures with discussions (n = 4), group work (n = 3), showing digital and analogue artefacts (n = 2) from their materials, going for the field trips or visiting museums (n=4). Educator C's comment encapsulates this idea:

*Another challenge for our students in these ten years is that it was easier to teach **theory** to students ten years ago than now. Now, we have to **fulfil the experience**, and then the theory is **absorbed** and thought about. So, if we are trying to explain a medium in image studies, well, the best way is not to write on the board the medium's definition but **show** it to them.*

The problem is that in most cases (n = 5), theoretical classes have too many students, which complicates the availability of personal attention to each student. Hence, that might impact the level of engagement. The Educator D vividly described this by saying:

This has been my quest in theoretical classes for the past four years. What can you do when you have 140 students in 120 minutes? They never come—all of them. So I have 100, 110, or something. What do you do with them?

Another obstacle is the amount of information educators must give their students during the theoretical classes. Some respondents (n = 5) expressed concern about the overload of content they have to put into their courses in the limited time. According to Educator C:

*In a history of art course, it is kind of difficult because **we do not have time**. We are trying to teach two centuries, sometimes two millennia of art and culture to a class, and we barely have time to breathe and **create** exercises.*

This feeling was echoed by three other participants who teach theoretical or combined courses. At the same time, those teaching practical courses, such as Drawing or Sculpture, also have the challenge of mixing theories and practice. Educator A expressed this sentiment, stating: *"The biggest challenge is being able to follow each person carefully and give them **personalised attention**. Being able to **reconcile the most theoretical and practical** parts in the same lesson."*

Two other participants who teach practical or combined classes made similar statements. Even though the overall experience of engaging the students during the practical classes proved to be less concerning, the issue of keeping the students' attention still exists. Educator B emphasized this:

*They'll be **fidgiting** with their phones and playing with this and that. And they don't have **patience** anymore. Everything is **so fast and quick and automatic**, and the social media that they're using is too much; they can't take it, and they can't **concentrate** enough time. So, you have to find the tools. Practical work here. Because, of course, a few are always really checking their phone. They're really not here. **They're somewhere else**.*

Another relevant finding of the study is the lack of communication and connection between students and the difficulties in establishing contact with educators, which also influences engagement. The results indicate that educators use various methods to improve those connections, such as learning more about their students (n = 4), finding the questions connected to students' interests (n = 6), opening the dialogue by allowing students to present (n = 6), using accessible language (n = 3), rearranging rooms or changing to outdoor classes (n = 2). A noteworthy quote on that issue from Educator C was:

*I guess we have to be very **attentive** and very **sensible**, to listen before we speak, to listen to the public to know our public and our demands, and well, we have to be engaged. If we are not*

*engaged, they will not be engaged, that's for sure. That's a rule that may be the only rule. If we don't live the moment, **they will not be thrilled.***

These results on engagement and communication reflect Han's (2015) theory of spiral curriculum and gamification, which, according to Han's research, can enhance students' motivation and active participation and positively influence communication and group work.

The approach of rearranging rooms and using the university's outdoor environments for classes links to the theory of utilising the campus environment for better learning (Maheran et al., 2017), which was explored more in the previous section but as articulated by Educator B: "*I can imagine in **theoretical classes** it can be very useful **to take them to the place they're studying**, in the country where you have science and the buildings and the history, **the layers in the city.**"*

It is crucial to note that the issue of communication arises more often in theoretical courses, which is also associated with the high number of students and the volume of information that educators need to teach. The quote from Educator C also demonstrates the issue:

*It's very good in a way that they deal with **the real problems** of researching and thinking about stuff because the teacher that comes to the podium and starts **deploying a lot of information**, like if it was a train unloading a cargo, no it doesn't work anymore, because for that they have internet and they need to think with us and we need to think with them to debate, the classes are more practical in that sense, **the exercise and the knowledge communication** are becoming more intertwined.*

Similar to Tagie and colleagues (2022), our study found that some educators (n = 3) noticed a shift in students' behaviour before and after the COVID-19 pandemic. Educator D, for instance, expressed their concern about the challenges they now face in initiating discussions and organising group activities with students in the post-pandemic classroom environment:

*And these past two years, I think it has been less. So, the ones that are now in the third year, they got the pandemics in the first year. I do not know if it is that, but **they [students] are very individual.***

This quote encapsulates the unique challenges educators are facing in the current educational landscape:

*So, to get them to work in groups, it is **violence** to them. Sometimes, I realise that I have to be very close with the groups and try to get them to work because it is that. And I still have not seen any evolution.*

In addition to the concerns about engagement and communication, the study revealed the struggle of training students' critical thinking skills, the demand for enhancing self-reflection, and the significance of learning historical and cultural background context. Educator C pointed out, "*They tend to have this fast food knowledge, and **critical thinking is becoming an endangered species.***". Which aligns with the statements of three other educators.

The historical and cultural background context is confirmed to be essential for imparting both theoretical and practical knowledge. Most respondents (n = 6) highlighted the connections they attempt to build between their course materials and overall knowledge of periods in art and cultural history. Moreover, half of the respondents expressed that creating that background knowledge during the field trips is more beneficial. Reflecting on their experience with outdoor learning and cultural background, Educator B stated:

*In arts, like in science or literature, we're all homo sapiens. I suppose we're all the same kind of creatures, so whatever we're studying. And either in science, literature, in arts, humanities or arts, you don't **produce** something, or **create** something from zero, nothing. You always have a **background**, there's always something. You're always **built upon an experience**, about a knowledge of, whether it's art history, or the history of science, epistemology, philosophy, you're always built on something that came before you. So in that sense, **the context of the city is one more context**, just one more context, and from where you pick up information, of course.*



The listed findings led to the forming of the final prototype, an educational walk based on theoretical material but combining practical objectives such as learning about composition. The prototype's tests confirmed that bringing practical knowledge to art history classes through interactive digital tools can benefit students and educators. All educators who tested the prototype (n = 4) expressed their openness to including such a tool in their courses as individual homework or a collective group activity during the classes.

The insights gained from analysing the first interviews also contributed to the final structure of the prototype, where links to additional information on the topic and questions for critical observations that can be used in the classes were added to the application. During the testing, the educators (n = 3) noted the effectiveness of that additional information for students. However, some participants (n = 5) also suggested that the combined notes with all information and links be given at the final step of the journey.

Lastly, the interviews with educators familiar with gamification exposed the importance of positive psychological aspects of playful activities. These educators (n = 3) noted that they partially use game

mechanics to lower the stress factors of group work, complex theories or public presentations. These results resonate with the findings of Han (2015) and Wang and Lv (2018), who implemented different game mechanics in their courses and stated the positive changes in students' anxiety levels and fears. However, there were differing opinions about cushioning students' experience. Thus, Educator H, who has extensive experience with gamification in different fields, stated:

*Honestly, working with a **large amount of theoretical information** is a key competence of a cultural scientist. I would not make this task easier for them because if I make it easier for them at the training stage, they will go outside my walls and ask why I got this diploma. They will not gamify it for me anymore, and now I will be left alone with these. I prefer **not to gamify what I need to fight in my life.***

Two other respondents expressed similar statements.



To summarise, this study found significant differences between theoretical and practical classes in student engagement, with practical classes generally fostering higher levels of engagement. Teachers often incorporate interactive elements like discussions, group work, and field trips into theoretical classes to boost engagement. However, challenges like large class sizes and extensive course content can hinder these efforts. Moreover, educators are conscious of the need to foster communication and connection among students and themselves, further influencing engagement. The study highlighted the importance of critical thinking skills and understanding historical and cultural contexts in theoretical and practical classes. Using gamification elements was seen as a potential tool to reduce stress and increase engagement, though opinions varied on its application. Lastly, the effects of the COVID-19 pandemic on student behaviour and class dynamics were noted, with a shift towards individualism and challenges in initiating group activities.

5.5 Visual Tools for Transformative Learning

One unexpected finding in this study was how often the transformative nature of outdoor learning came up during the interviews with educators, even though they had not been directly asked about it.

When Educator G spoke about field trips that they actively took with their students and the changes they noted in their students after walking tours, they offered this insightful standpoint; *"It was like, "Wow, I never saw it that way before!" It's like a **switch flips in your brain**, and suddenly, your whole **perspective changes.**"* Another educator experimented with teaching methods, and one of their tasks

was to bring “an object that you find very difficult to interact with” and they mentioned that such tasks might not be transformative experiences, but it gives new openings for discussions:

*I want them to start to realise that there are objects that, although it's not something very serious, but something that really makes your life easier, and they don't even notice that, and it doesn't have to be a **transforming experience**....they bring their **frustrations**, or they bring their small victories every day, and we start to **discuss** them, why does it happen, and then we have other techniques just to help them choose what they want to talk about.*

This theme connects to the concept of transformative learning discussed in the literature review. Even though the review showed that transformative learning in art and cultural domains is still rarely studied, the interviews emphasized the themes of reflection, self-criticism, personal growth, and changing perspectives in the context of active learning, specifically outdoor learning. The changing perspectives and transformation of the vision of the places that participants visit often consistently appeared during the prototype testing. All educators (n = 5) and most students (n = 4) noted that the application works incredibly well as a tool for looking differently at study materials and the world around them. Educator's H observation on the prototype highlights this finding:

*It seems that as some kind of starting point, this can form a good wow effect from the series "God, I started **to see differently**." I really liked your emphasis on how you **change optics** as an artist. I think this is the best way to emphasise such a thing.*

While some testing participants mainly focused on the range of the tasks that allowed them to change the optics (n = 5), others (n = 4) were surprised that the application gave them a new understanding of the places they frequently visit. Summarising their thoughts, Educator C remarked, “*And the exercise in the garden was very good as well. Very, very good. And I'm a little bit ashamed of saying this, but I **never watched that garden in this way**.*”

Interestingly, the data showed the consistent use of drawing as a tool for visualisation (n = 5) not only by educators who teach more practical courses but as a tool for theoretical classes about art history or digital humanities. Educators (n = 2) suggested building an activity that would somehow facilitate drawing. Moreover, students (n = 4) suggested incorporating drawing tasks into the application during the testing sessions. An illustrative comment from Educator A was:

*I draw on a board, **always drawing**. It helps them **visualise** the process. Everything is very abstract, you know? When I make a drawing, they... “Oh! This is the way.” I think the method of drawing the objects really helps them understand what they must do in **three dimensions**.*

Another view on bringing drawing and photography to the classes came from a cultural studies course, and it aligns with previously discussed findings about using materials and analogue tools in the classes. Educator C's comment encapsulates this idea:

*I printed these A3 pictures, old pictures and old maps, and I took pens and pencils, and then we were using them as an interactive board...We put all the paper on the grass, and we are all over that, like architecture students **drawing**, and I also tried to use the art students drawing skills and **photography** skills in their works. So sometimes I use those rolls of paper on the big table, and then we are drawing things.*

One of the unexpected predominant themes of the study is the use of photography and the practice of taking pictures on various occasions, like taking selfies with the paintings, taking photographs during the *dérive* walk, or taking photos of objects during the outside classes and using them later for drawings and sculptures or studying of the perspective lines.

The results consistently showed photography as the most favourable digital visual teaching tool mentioned in most interviews (n = 6). There were a range of perspectives on using photography as a learning tool. Two of the participants used it for analysis, e.g.:

*I tell them to use a phone to **photograph**, and then they **analyse** the photograph, the frame they chose, and then see the main lines of the perspective or the figure or the statues or whatever we're doing. So, it's just one more **tool that we use as a learning device**, photography through the phones.*

For others, it was the tool to see a different point of view: “*It is important, for example, if you use **photography** as a way of **creating a point of view**, a detail or something like that.*”

Not all has wholly positive view of photography. Educator C also stressed the overuse of images and photography that leads to the lack of critical looking:

*I have a lot of images, a lot, almost **over exposition of images**, that can be good, but because they have that over exposition of images through their hands, through their own means, sometimes, I have to use a whole class to look at one image, to stress them, their lives out of that image, because they have to stop, look and think about it.*

Even though photography was mostly discussed during the interviews in the context of digital tools, a few educators also mentioned printing materials as a necessity for different reasons. For example, as a more practical view but also for expanding the sense of physical materials: “*Sometimes I use prints as well, because, well, sometimes the harshness of the sunlight, it's very difficult with the screens, but to have a sense of materiality. **Sense of materiality.***”

Some of the participants (n = 4) expressed their concerns about the increasing connections to materials and physical objects caused by digitalisation. According to Educator C, *“I guess we will deal, at least after pandemics and a lot of **digital and virtual mediators** world, I guess we'll have to fight this tendency to **disengage** from the physical world.*

Half of the tasks in the prototype involved using photography to explore the surroundings in new ways. The results demonstrated a positive increase in engagement, playfulness, and interaction with the environment. The project highlighted the versatility of using photography and its ability to teach a wide range of themes. Additionally, all 12 participants confirmed that each task taught them something different.



The findings provide empirical support for Butterwick and Lawrence's (2009) statement that drawing and photography are used in their research on transformative learning. The insights gained from this analysis also contribute to the study of outdoor education as a method for changing students' perspectives and bringing theoretical knowledge to the practical domain. Visual tools, both analogue and digital, and interactions with objects through different senses have a perspective for further study on new teaching methods for Art and cultural studies.

5.6 Conclusion

In conclusion, this research has highlighted the potential benefits and challenges of integrating gamified learning tools and outdoor education into the formal education system for Art and Cultural Studies.

The study found a lack of awareness about gamification and new teaching methods in education among participants, yet a strong and empowering willingness to explore and implement these methods after gaining an understanding and methodical support. There was a strong consensus that gamification, while less necessary for adult education, can enhance student engagement and provide a refreshing change in learning dynamics. On the other hand, time constraints and work overload among educators emerged as potential barriers to the adoption of these new teaching methods.

Outdoor learning was strongly noted for its ability to foster engagement and provide a rich, contextual learning environment. Yet, the need for enhancement of tools facilitating these activities was also expressed.

Overall, the findings suggest a promising future for the integration of these innovative teaching methods, provided that they are introduced thoughtfully and in a balanced manner.

6. Conclusion and Future Work

This dissertation began with the assumption that cities can serve as effective educational environments and evolved into an in-depth exploration of innovative teaching methods and tools for Art and Cultural Studies educators. The research highlighted the potential for gamified digital tools to enhance the learning experience by improving student engagement, facilitating interaction with the environment and educational materials, and strengthening communication between students and educators.

One of the most significant findings was educators' overall lack of awareness regarding gamification and new educational tools. Initially unfamiliar with these concepts, most educators who participated in the research expressed a strong interest in learning more about gamified teaching methods once they were introduced. This indicates a demand for knowledge and resources that could foster the adoption of these innovative methods despite all constraints of traditional education.

The study also identified time limitations as a major barrier preventing educators from exploring and implementing new teaching methods. Most educators are burdened with administrative tasks and the challenge of incorporating extensive theoretical information in limited time frames. This results in a dependency on familiar teaching tools despite a genuine interest in discovering and testing new methods.

A notable difference was observed between theoretical and practical classes, with educators finding it particularly challenging to keep theoretical classes engaging. While many try to integrate practical tasks or activities, the large class sizes and dense curriculum of theoretical courses make it difficult to maintain student attention and implement active learning strategies effectively. This imbalance often leads to lower student engagement in theoretical courses.

The research also highlighted communication and group dynamics issues, worsened by increased individualism following the pandemic. Gamified learning emerged as a promising solution to these psychological barriers, with the prototype demonstrating positive outcomes in terms of engagement and critical thinking. The testing of the developed prototype showed that similar tools can facilitate group activities while respecting students' comfort zones, promoting a more cohesive and interactive learning environment.

Another key finding was the high effectiveness of outdoor learning, with students and educators reporting enriched educational experiences when engaging with the city as a learning environment. The tangible interaction with urban spaces provided a practical context for theoretical concepts, making learning more relevant and memorable. Despite the logistical challenges of organizing field trips, such as time constraints, budget limitations, and safety concerns, educators acknowledged the immense value of these activities for team building, active learning and a comprehensive understanding of cultural and historical contexts.

Visual tools, particularly photography and drawing, were found to be highly effective in transformative learning. These tools give students an opportunity for more creative and engaging learning. The positive feedback on the prototype from participants indicated that changing familiar scenery during tests fostered transformative learning, encouraging students to view study materials and their surroundings from new perspectives.

Importantly, the study revealed that some educators have already begun incorporating new methods into their courses and are more open to testing additional tools and methodologies. Half of the participants expressed willingness to collaborate on creating educational interactive walks related to their subjects, suggesting a growing acceptance and enthusiasm for innovative teaching strategies.

The study confirmed that cities' rich cultural and historical backgrounds can serve as dynamic classrooms, promoting exploration and curiosity. Gamified location-based educational applications have proven to be effective learning tools for Art and cultural studies, transforming urban landscapes into interactive learning environments. These methods can make education more engaging and effective, significantly enhancing traditional educational frameworks.

For these innovative methods to be successfully integrated into the educational system, universities must provide support through additional time and workshops dedicated to introducing and training educators in new methodologies and tools.

The tested prototype holds high potential for future development, with plans to include both theoretically oriented educational walks and practical courses focused on real-world applications of materials, colour, shapes, and textures. The collaborative approach with educators ensures that these tools are designed to meet their needs and perspectives, enhancing their practical utility. While the prototype also shows promise for applications in tourism, its primary focus will remain on education, given its greater value and potential impact in the field of Art and Culture. As one respondent aptly stated:

These small changes are going to demand a lot of effort from those who want to implement them, and I also think that it should start with us, Culture and Artistic Studies.

If not us, then who?

This study not only highlights the potential for innovative educational tools but also calls for a collective effort from educators, institutions, and stakeholders to embrace and implement these changes, paving the way for a more engaging and effective learning experience in Art and Cultural Studies.

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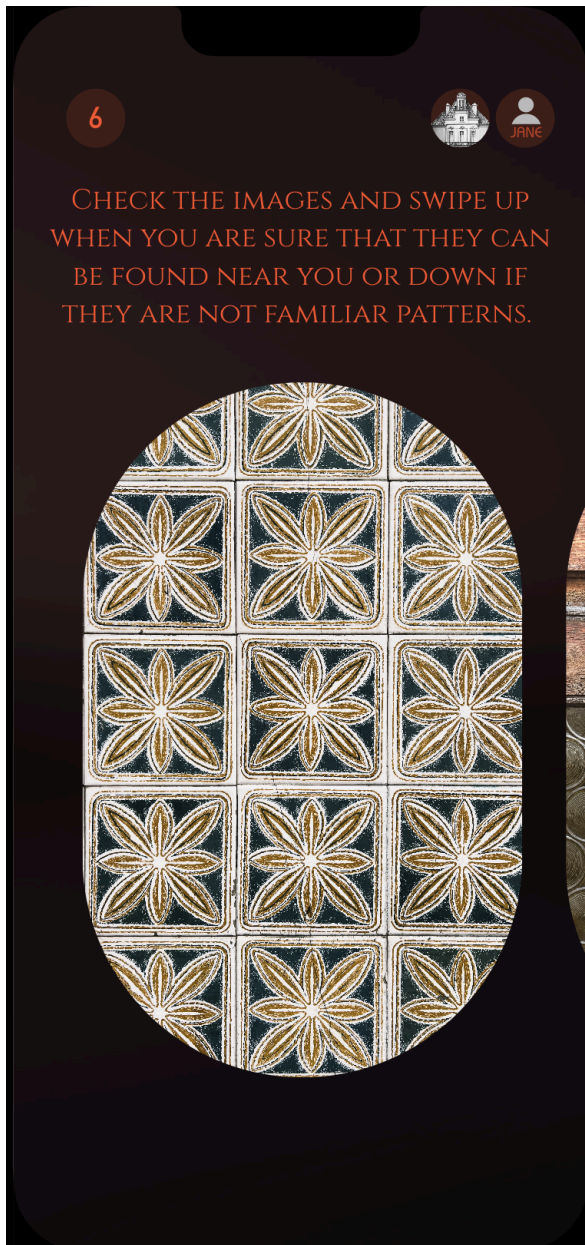
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Appendixes

A. Interfaces of mock-ups and the final prototype

Interfaces of Rhythm task and Perspective activity screens before the final testing phase



Interfaces of Rhythm task and Perspective activity screens in the final prototype



B. Link to the final interactive prototype

Please remember the following information:

The prototype can be opened on any device. However, it's important to note that using the camera, resizing, and rotating objects won't work on a computer browser. You can use all these functions in the smartphone browser. The best way to check the prototype is through the Protopie application on a smartphone, which is available for free download on Apple and Android devices.

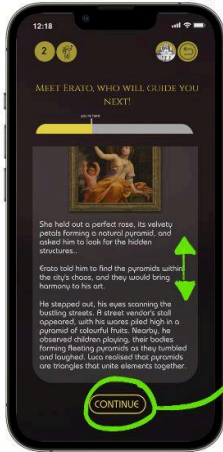
<https://cloud.protopie.io/p/a6cfaee30b7add33ddf21e36?ui=true&scaleToFit=true&enableHotspotHints=true&cursorType=touch&mockup=true&bgColor=%23F5F5F5&bgImage=undefined&playSpeed=1&handoff=true>

C. User Journey

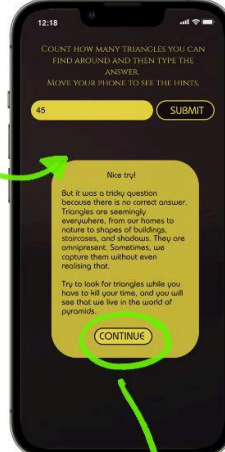
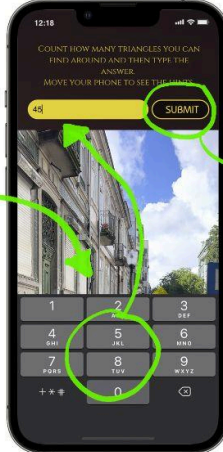
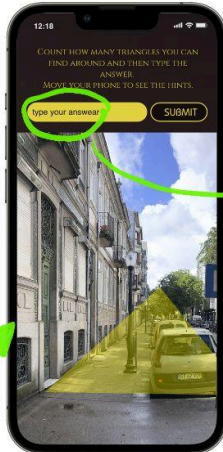
The green arrows indicate interactions and connections between screens in the prototype.



Point #3 description



Point #3 Task



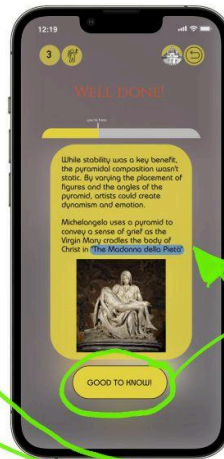
Point #4 description



Direction



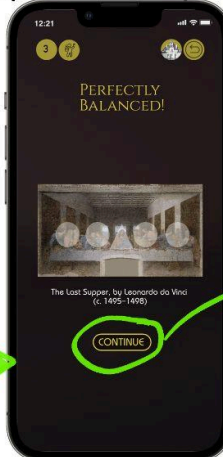
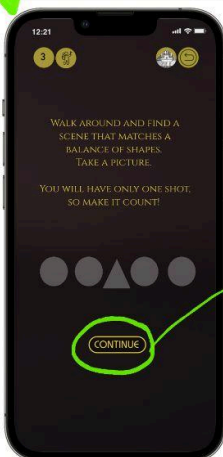
"good to know"



Point #3 Main Info



Point #4 Task. 1st attempt



opens google maps with destination

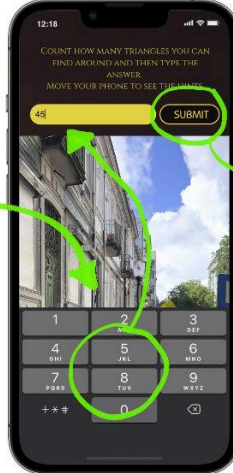
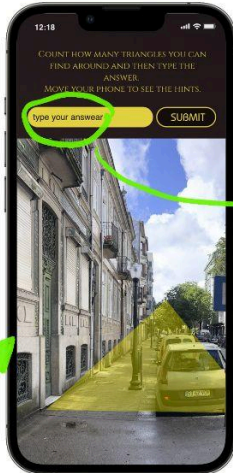
opens screen with second attempt for task #4

takes a picture and saves it on a device

Point #3 description



Point #3 Task



Point #4 description



Direction



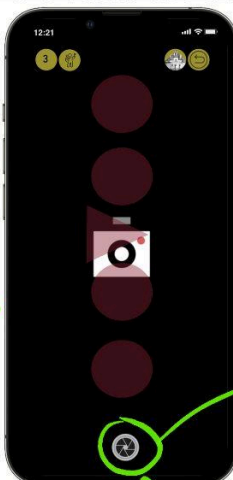
"good to know"



Point #3 Main Info



Point #4 Task. 1st attempt



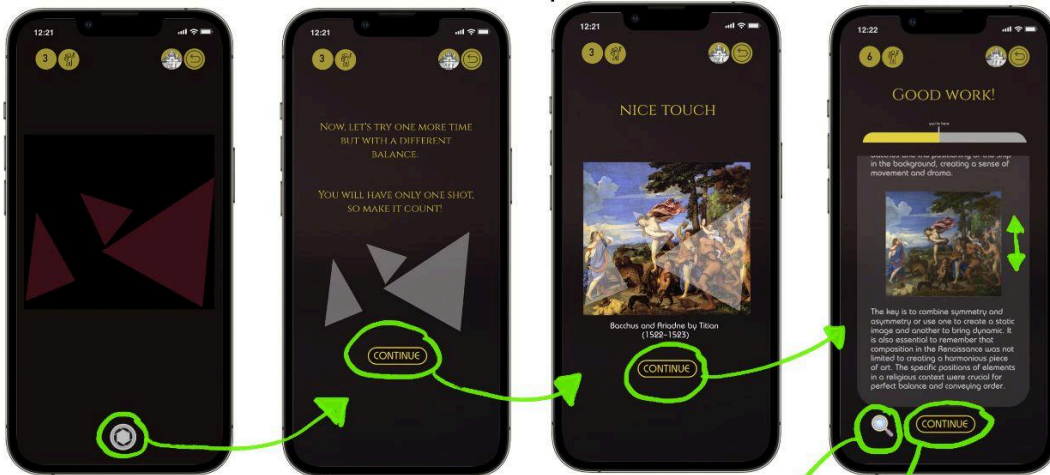
opens google maps with destination

opens screen with second attempt for task #4

takes a picture and saves it on a device

Point #4 Task. 2nd attempt

Point #4 Main Info

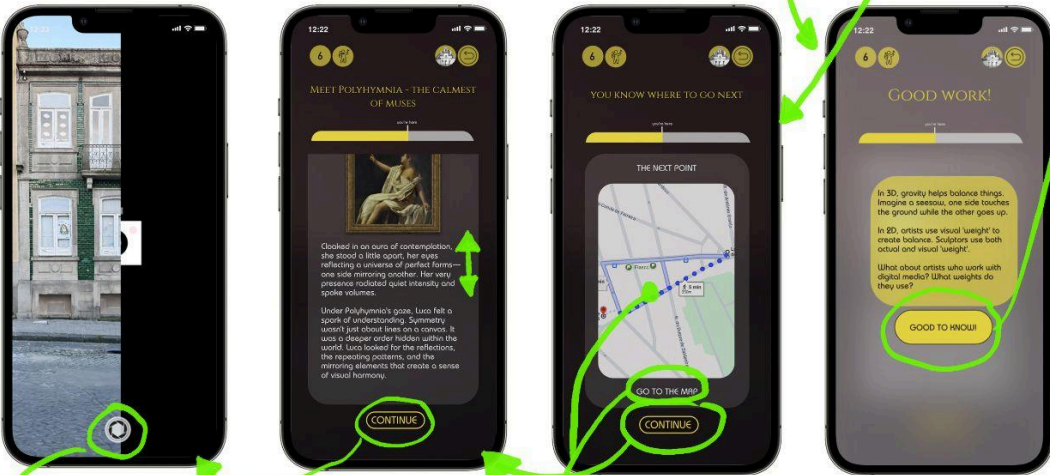


Point #5 Task

Point #5 description

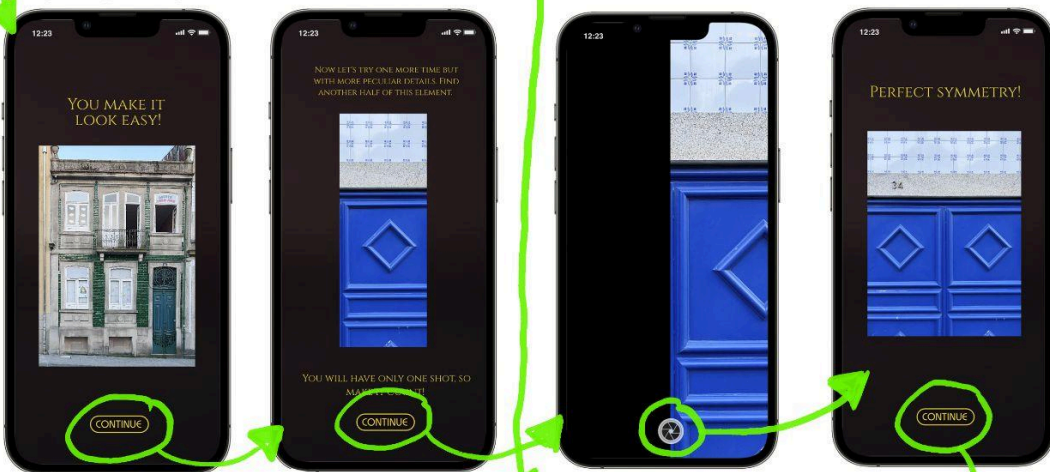
Direction

"good to know"



Point #5 Task

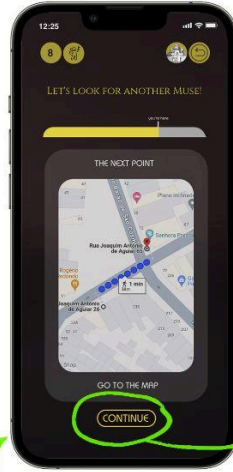
Point #5 Task. 2nd attempt



opens google maps with destination

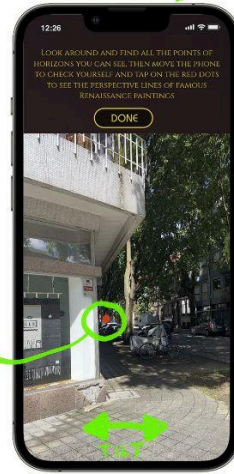
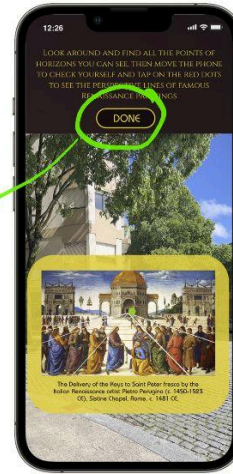
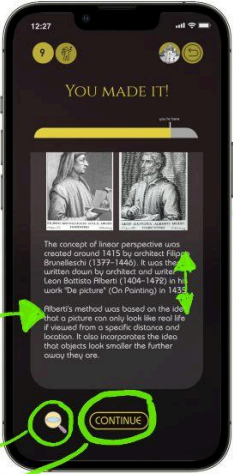
opens screen with the main info for Point #5

Point #5 Main Info "good to know" Direction Point #6 description



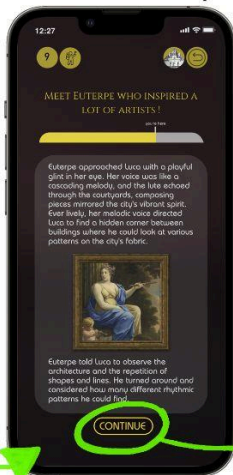
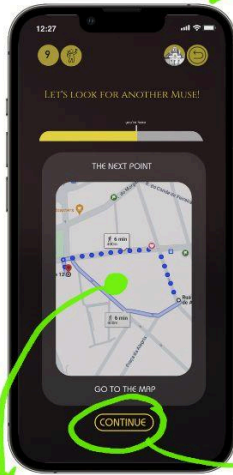
"good to know" Point #6 Main Info

Point #6 Task



Direction Point #7 description

Point #7 Task

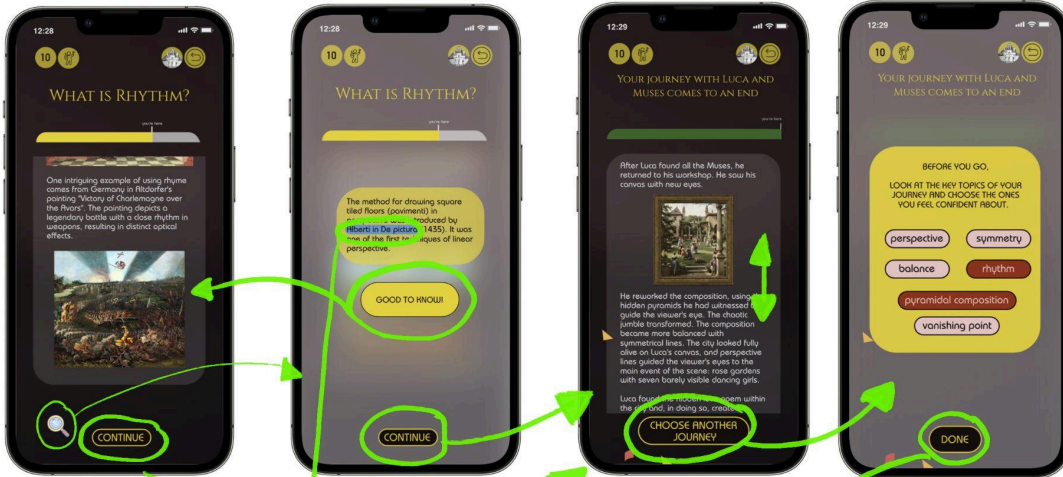


opens google maps with destination

opens screen with the main info for Point #7

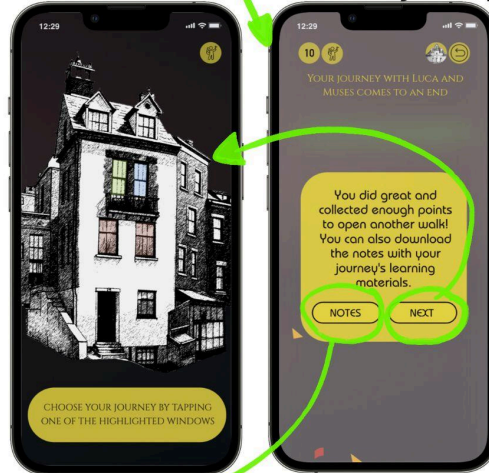
Point #7 Main Info "good to know"

The end of journey



Homescreen

The end of journey



opens page with material in a browser

offers to save a file with notes from all learning materials