Heritage and Digital learning

understanding how communities learn about Cultural Heritage from online content and how it can be embedded in traditional education

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Heritage and Digital learning: understanding how communities learn about Cultural Heritage from online content and how it can be embedded in traditional education

by

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Abstract

Recently, Massive Open Online Courses (MOOCs) have become prominent in the Higher Education market. Increasingly, universities are offering a greater variety of courses to improve their appeal to prospective students and to promote their research to the public. Specifically, in the context of Higher Education heritage domains, some MOOCs have focused on making interdisciplinary content globally accessible to a wider audience, to provide additional blended content within core learning and teaching, and as a marketing tool.

Since 2013/14, the University of Southampton and FutureLearn have been running a MOOC that aims to provide an introduction to the history and archaeology of the Roman Mediterranean site of Portus, and is open to the international community and aligns to UK Higher Education priorities and curricula. Until now, the course has engaged thousands of learners who contributed with comments, ideas and questions, building upon the Portus project's previous disseminated work via the BBC documentary Rome's Lost Empire, through other mass media including its own websites, blogs and social media, in exhibitions, and via activities at the archaeological site. Most of the material that is openly available has been translated into Italian by the author of this thesis, in an attempt to engage Italian speakers, raise the profile of the site in Italy, and enhance the cultural and linguistic diversity of the course and its learners.

At the same time, the Italian government has developed a series of articles (Law n. 107, 13/7/15; "La Buona Scuola") and policies (e.g., Strategic Plan by TDLab) to develop global citizenship skills among new generations via education and to develop Italian tourism. This thesis thus examines the use of MOOCs and other online open materials as a transnational medium to link higher education institutions to secondary schools, specifically targeting 16 to 18-year-old pupils in Italy, in an attempt to improve and internationalise the online content available for the face-to-face and blended school environment.

Content and Language Integrated Learning (CLIL), blended learning, self-contained activities as part of a work placement (such as the creation of 3D models or new content on Wikipedia), and online tools have been used to increase access to educational content, develop teachers' skills, promote cultural literacy in geographically dispersed student communities, and to develop future world citizens. The data collected also provides important insights to understand how the digital component can be improved to enable better reuse within a truly internationalised course that can integrate traditional education to shape our society.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

ASL   Alternanza Scuola Lavoro (work experience)

CLIL   Content and Language Integrated Learning

cMOOC   connectivist Massive Open Online Courses

DiAL-e   Digital Artefacts for Learning Engagament Framework

EQF   European Qualification Framework

EUNIS   European University Information Systems

IT   Information Technologies

MOOC   Massive Open Online Courses

OER   Open Educational Resources

SMOG   Simple Measure of Gobbledygook

SOLO   Structure or Observed Learning Outcomes

Synote   Synchronised Annotation

xMOOC   extended Massive Open Online Courses

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years, offering constructive advices all the way in between meetings and teleconferences. With you, I have truly understood the power of international networks and friendship.

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And finally, I would like to thank Grant for filling this journey with great loud music.

Chapter 1   Introduction and Aims

"Credo sia importante far vedere a tutti, dal notaio all'idraulico,
la ricchezza che c'è nella conoscenza. Noi diamo cibo per la mente.
Più c'è conoscenza più ci sono equilibrio, saggezza, tolleranza"

"I believe it is important to show to everybody, from the notary to the plumber,
the wealth that exists in knowledge. We give food to the mind.
The more knowledge there is, the more balance, wisdom, tolerance."

Alberto Angela, 2017

This thesis aims to investigate how the compulsory school curriculum could be integrated and enhanced with resources from heritage Massive Open Online Courses (MOOCs). It seeks to explore different user-led digital pathways to knowledge, fostering a variety of scholarship models from the same resources. During the research process I have played three distinct roles representing the Italian community in the Portus project team. I was involved in the MOOC as a PhD researcher employed to translate some of the content, was an instructor on the MOOC, and was a participant observant (Denzin, 1989) during the pilots. All roles developed alongside my career journey, which led me to my current position at the university where I have oversight of areas related to the topic of this research. These roles have been carefully balanced to minimise the bias introduced through the process, as presented later in this chapter.

The concept of a connection between knowledge and travel has been at the centre of the Western European agenda since the 1600s, supported by many explorers and travellers. At that time, wealthy young men and women were travelling across continental Europe to expose themselves to the legacy of classical antiquity and the Renaissance as part of a "Grand Tour". The tour, which increased exponentially with the development of large-scale rail transport, represented the first intersection of travel and education (Baram, 2004: 9-15), and has since developed into the mass tourism we know today. It was only with the development of Goethe's World Literature (*Weltliteratur*) and travel plan that the cultural dimension was recognised as an integrated piece of the globalised experience (Pizer, 2000; Adamo, 2013). Goethe imagined the emergence of a form of international literature exchange facilitated by the development of transport, communication and, in particular, by the progress of the press and the flowering of translations. The availability of content in an understandable language would have allowed mutual knowledge transfer

between peoples and authors from different regions, allowing them not only to come into contact with the other in its specificity but also to become aware of the way in which one's identity was perceived from the outside (Adamo, 2013).

In recent years, the rapid growth in tourism has increased discussion regarding the impact of visitors and their consumption of heritage both physically and digitally (García-Hernández et al., 2017). Archaeologists have also been involved in increasingly complex debates regarding representation and the use of cultural heritage, how our past and its interpretation conditions identity, and how cultural history[1] can create a community (Kane, 2003). Reynolds (Reynolds, 2015) demonstrates that as communities are settling in a territory, they are also developing relationships with the environment, the community itself and evolving a 'sense of place', and this process produces new tangible and intangible heritage.

This research embraces all these aspects. It takes the Grand Tour concept virtually, where users are guided digitally through a set of online resources related to antiquities, some of which have been translated, creating a globalised and geographically dispersed community within a heritage MOOC platform. It also delivers a unique and personalised learning experience that could not be replicated otherwise, exactly how the Grand Tour was initially conceived. Like its more exclusive predecessor, this new modern community formed by online learners will then produce new reflexive heritage content, with MOOCs and open resources acting as the medium for the communication of cultural content and archaeological expertise.

This research will then explore how this concept can be adapted to complement the compulsory age curriculum in England and Italy, using the latter school context as an example after having analysed its impact on the online community. In particular, I will focus on the 16-18-year-old range, which is not a well-represented demographic on online learning platforms at the time this research was conducted[2]. The rationale behind this scholarship project emerged from my involvement on the Portus project and developed during my time as a facilitator on the Portus MOOC, where I had started to translate some of the content (transcripts, subtitles and blog posts) into Italian in order to make it more accessible to the Italian community and to engage with some of them directly in both

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[1] I am here referring to the interdisciplinary area that looks at popular cultural traditions and experiences. I am also acknowledging that culture is a "*fundamental part of the distribution of resources*" (Melling and Barry, 1992: 18f).

[2] The COVID-19 pandemic erupted at the latest stages of this research (2020) has changed the way in which teachers and students are interacting with online resources during teaching and learning at all levels.

Italian and English. In fact, it was a conversation with one of the learners on the third time the MOOC was run that made me re-think how the material could be reused in different and innovative ways:

"Dear Eleonora, sorry for being late in my reply but I am busy with my students' final exams in this while. Thank you very much for your kindness. I am very involved in this course and I would like to organise activities in English with my students using your beautiful resources. I really appreciate your work and I wish I would keep in touch with you and your team's work."

And subsequently:

"Dear Eleonora, I am not so good at technology and sometimes I make mistakes when I use modern devices. Sorry for that! My aim is to structure activities referring more or less to the Content and Language Integrated Learning (CLIL) methodology although I can't work with my students using this method because I am a teacher of linguistic subjects (Italian and Latin at a secondary school specialising in classical studies and in modern foreign languages). I wonder why but I don't know. In Italy these things happen. I would like to organise specific activities working together my colleagues who teach modern languages (English, German, Spanish or French). I am keen on ancient Roman History and I love Latin culture and authors. Now I enjoy this course really fascinating!"

The next chapters will illustrate the methodology and decision taken based on my in-depth knowledge of the UK context where the MOOC was created, of the Italian syllabus, and of the challenges currently being faced due to ongoing educational reforms. I have decided to restrict the comparison to the English context in the UK as Scotland and Wales have a different compulsory education school system, and a direct comparison of the curriculum would not have been possible.

1.1 Research Questions

The site of Portus represents an ideal example for exploring the impact of online heritage information in education. In the chapters that follow, this overarching research agenda is addressed via the following research questions:

1. Can Massive Open Online Courses (MOOCs) with a heritage focus be used effectively within compulsory secondary education in connection with Content and Language Integrated Learning (CLIL) and work experience methodologies?

2. Can such heritage MOOCs increase access to education content amongst secondary school students?
3. How can heritage MOOCs create educational links between higher education and schools, to promote cultural heritage literacy in geographically dispersed communities[3]?
4. How can heritage MOOCs engage 'local' communities, in particular via secondary schools?

1.2 Aims and Objectives

The first and the second of the above research questions has been approached through the identification of a methodology for building local, national and international communities around cultural heritage sites, focused on secondary school learners.

Creating a series of activities linked to blended or service learning that would engage students based in Italian schools has been used as an initial approach to the third research question. Pupils have then worked and interacted via online platforms, to exchange expertise and develop skills.

The methodology proposed has been evaluated in the context of the Portus online community to address the fourth research question. The level and type of engagement with the site and the consequent impact on the reuse of MOOC materials for different purposes has also be explored.

1.3 Scope and Limits

The online course taken as an example by this research was produced within a UK higher education context and aimed at a wider English-speaking public, informed by advice from FutureLearn[4] with whom the developers of the MOOC were closely involved. The Portus MOOC was one of the first to be developed by the University of Southampton for FutureLearn, a UK-based social learning platform where courses are available to a wider audience with the lowest barrier to participation, with planning beginning before the platform had launched. Due to the geographical location of the site of Portus and the

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[3] For the purpose of this thesis, by geographically dispersed communities I mean groups or individuals in different worldwide locations. In the pilots, I am referring to communities which are geographically distant from the institution that developed the MOOC (the University of Southampton) and the site of Portus.
[4] https://www.futurelearn.com

heritage information included in the material, the Italian speaking community was also identified as an important audience of interest.

The study conducted here and presented in the two pilots (Chapters 5 and 6) will be confined to the material produced as part of the Portus MOOC hosted on the FutureLearn platform, limiting the large number of external resources linked to any of the course's sections, which are known as "steps". It will analyse how content and pedagogy can be re-applied to serve the Italian education system and community better. Restricted analyses on the interactions and language used across different platforms linked to FutureLearn will be presented to contextualise engagement and links between the MOOC and the additional platforms. The research has developed alongside the development of the platform, which at the time of the pilots was lacking some of the functionalities (e.g. granular learners' data and readability) later developed.

Equivalences between the English and Italian higher education system's levels and modules have clearly been articulated and simplified by the Bologna Process reform; however, equivalences between the English and Italian secondary school system has been more problematic. This is conditioned by a series of different national standards that regulate the quality of each module/curriculum and language standards, while the European Qualification Framework (EQF) ensures equivalence between levels. In both contexts, the UK and Italian, digital literacy initiatives are included as part of educational programmes even if they maintain a different focus. While the UK has a diversified approach that includes organisation and networks (e.g. Ofcom and Jiscs), educational projects and training as top initiatives on digital skills, digital creativity and media literacy, Italy's focus on educational programmes focuses on information technologies and safe use of the internet (Couto et al., 2018). This diversity of focus and approaches demonstrate how diverse the approach to the promotion of digital literacy across Europe will be illustrated later in this chapter and in relation to the education systems.

The mapping conducted is summarised in
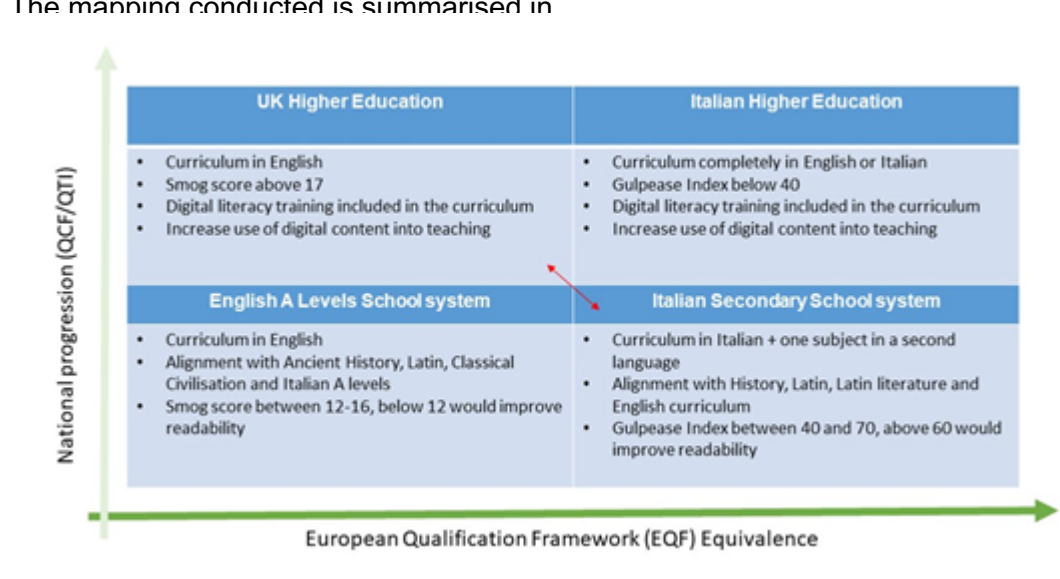
Figure 1 and aims to create a framework where assumptions can be made to create better integration between the Italian secondary school system needs, and the UK higher education system offer.
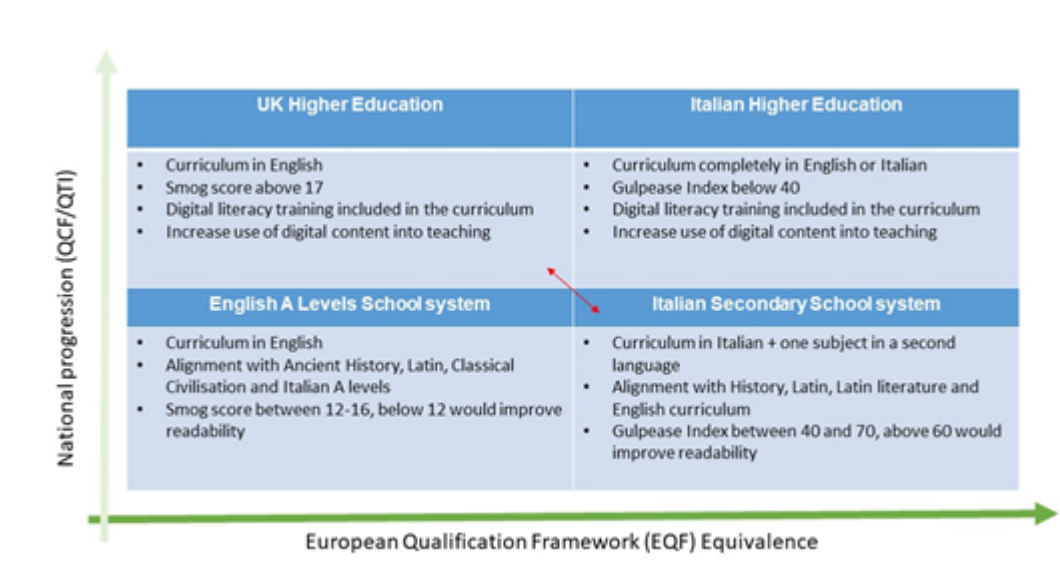
Figure 1 Map of equivalences between the English and Italian education systems

One of the main difficulties encountered during the alignment of the MOOC content to the English and Italian modules is related to the structure of each subject, for example, "history" in the Italian school includes notions from prehistory to Roman times while in England the same subject is divided between "ancient history/classical civilisations" and "history". In both countries, teachers have some freedom to adapt the content of the subject to the class and to the local environment.

The decision to conduct the data collection only on Italian schools has been driven by the confidence in the mapping conducted as part of this thesis, and the willingness to engage with the Italian community. For this reason, I was able to resolve some of the issues emerging during the translating process without a separate evaluation in an English school.

1.4 My Contributions

In this thesis I investigate the possibility for the same MOOC content to be re-purposed by different communities for educational use, arguably the first comprehensive body of evidence of this kind, which will include: 1) a thorough mapping of MOOC learning objectives from compulsory to higher education and related information to support the content producers during the development of online resources (see Chapter 2.4); and 2) two digital scholarship based pilots (see Chapter 5 and Chapter 6) exploring the practical re-use of the same content for CLIL and skills development during work placements via Service Learning by Italian teachers.

The viewpoints in this thesis are reflective of the different roles I had in this project, already mentioned at the beginning of this chapter, and that have influenced some of the decisions taken during the thesis project. As a representative of the Italian community within the Portus project team, first as a PhD researcher and then as a participant observant, I have been able to re-use the material initially created to embrace some of the components identified by Boyer (1990) in his view of digital scholarship represented in the table below (Table 1). When referring to the development of information literacy and digital skills activities, I am focusing on the priorities identified by the Italian government in relation to the national curriculum and the more recent school reforms. While digital skills focus on the tool to be used (e.g. learning how to use software like Sketchup for the creation of 3d models as part of the two pilots presented in Chapters 5 and 6), digital literacy is about the use of our own judgement to understand when and how to use a particular tool (e.g. use different dataset and the information presented through the pilot to create our own interpretation of the data) (Bali, 2016).

	DEFINITION		
DEFINITION	Discovery is considered to be what is traditionally referred to as 'research'. Boyer describes discovery as disciplined, investigative efforts within the academy, leading to the discovery of new knowledge.	Integration across disciplines where fields converge that seeks to question, interpret and place research within a wider contest and draw our new insights.	New intellectual understandings arise o applying the outcomes of discovery to th world—creating interactions between theo practice that can benefit government a society.
ACTIVITIES AS ITALIAN COMMUNITY REP	Brought new insights across-discipline, new knowledge was created by exploring how the material can be used by Italian Schools Development of networking and virtual community practice Visual data and literacy		Creation of public engagement interactior and influence via social media in English a Italian on Twitter during the Archaeology Portus MOOC
ACTIVITIES AS PhD	Identification of opportunities to reuse the Archaeology of Portus MOOC resources as integration of Italian compulsory education curriculum	Development of collaborative working on texts, e.g. blogging and translation of resources	Analyses of educational theories and educational opportunities that can be applied to the Archaeology of Portus MOOC
ACTIVITIES AS PARTICIPANT OBSERVANT	Creation of two pilots as part of the research		Public engagement and influence via soc media in English for Italian students (Pilot

Table 1 This table shows the activities I have undertaken through the different roles I have played according to the four components identified by Boyer (1990) when

In all cases, my involvement has inevitably introduced a bias into this research, from the language used in the Italian translations, to the social media used during the initial phase and the way schools have been selected to participate in the pilots (Table 2).

This research has contributed to the understanding of accessibility in MOOCs, particularly in terms of language and geographic literacy[5] , with a focus on compulsory education. The first re-use of the material has led to the creation of translations in Italian, enriching the resources available (including social media and blog posts), while the readability analyses applied as a second step has transformed the original content in English to be more suited for broader community engagement. The two pilots have extended the current literature, filling the gap in representation by 16 to18-year-old compulsory education. Alongside, the re-use of the same resources in different educational delivery methodologies represents an innovative approach, as current research in this area focuses on outcomes from only one specific integration. For example, the inclusion of MOOC content in traditional higher education curriculum has been explored quite extensively (Sandeen, 2013; Belleflamme and Jacqmin, 2016; García-Peñalvo et al., 2018; Hendriks et al., 2020; Meneses et al., 2020; Perguna et al., 2020). However, there is no research on how the same content could be adapted to different educational settings. In the context of Content and Language Integrated Learning (CLIL) in Italy, research has focused on pre-16-year-old students (Mair, 2018), with only one study focusing on CLIL applied to a museum context (Fazzi and Lasagabaster, 2020). In all the examples present on the literature, resources have been created ad hoc by teachers to meet a particular curriculum need (Abbate, 2019) Abbate, 2019; De Meo, 2015; Bosisio, 2015; Coonan, 2014). Conversely, this study focuses on the creation of resources that can be used and re-purposed to different contexts, including work placements, without the need of additional adaptations.

Work placements are usually conducted in the language of the country of residence or in the language where the placement is taking place. Research published by Benvenuto (2019) shows how Italian students often travel to different countries over the summer to conduct work experience, as it offers the only opportunity to overlap language and work skills development.

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[5] Geographic literacy is defined as the "ability to use geographic understanding and reasoning to make decisions" (National Geographic, 2014).
https://web.archive.org/web/20140416071705/http:/education.nationalgeographic.com/education/geoliteracy/?ar_a=1

ROLES				EXISTING RESOURCES AND ACTIVITIES	RESEARCH AND OTHER OUTCOMES	BIAS AND INFLUENC
ACTIVITIES AS A ITALIAN COMMUNITY REP				Portus MOOC content	Initial production of transcripts and subtitles in Italian. This has been the first instance of reuse of resources. It was also one of the first MOOCs in FutureLearn offering some content in a language other than English	Social media interaction Decisions made on the Italian
				Portus MOOC and Portus project website and blog	Translations of all content included in the Portus website and blog	Social media interaction Decisions made on use
				Portus MOOC educator (3rd run)	Supported the learners during the MOOC run with the specific remit of supporting the Italian community	
	ACTIVITIES AS A PHD STUDENT			Learning objectives mapping	The existing mapping created by Earl (2014, see Chapter 2) was extended to include compulsory schooling	
				Social media	Translation of particular posts and re-posting in Italian from my Twitter account to engage with the Italian community.	Decision on what post t the Italian heritage envi Content initially shared Twitter was used at this
		ACTIVITES AS PARTICIPANT OBSERVANT		Pilot 1 - Re-use of material (CLIL methodology)	The collaboration with the Italian teacher resulted in a long-standing relationship with the school and follow up visits.	This initial pilot involved Only resources from the Decisions made on the teachers' needs (nation Social media use was i
			ACTIVITES INFLUENCED BY MY INTERNATIONA OFFICE JOB	Pilot 2 - Re-use of material (service-learning + work placement methodology)	The collaboration with the Italian teacher resulted in a long-standing relationship with the school, and the teacher leading the project is now hosting Southampton recruitment events.	Pre-existing knowledge British Council was faci The system used based Development of Portus Visual data produced e

Table 2 A summary of the roles I undertook in relation to the activities portion of this research. The research, outcomes and biases introduced are then linked to indiv

The work presented in Chapter 6 transforms the current research by introducing a different way to include an international component to placements via the creation of activities linked to service learning using resources in a different language. While readability has been applied to the MOOC context recently (Cross et al., 2019), this research represents the first documented attempt in a multidisciplinary context where the readability scores have been matched with school language standards. Furthermore, FutureLearn has only recently (March 2020) added a readability function for articles[6] allowing authors to check how difficult the text is. The score is calculated using a Flesch-Kincaid test, which is similar to the Simple Measure of Gobbledygook (SMOG) analyses used to analyse the MOOC text (see Chapter 2.5).

In addition, this work contributes more generally to the different ways local communities can engage with their heritage while contributing their own content.

1.5 Thesis Outline and Methodology

The case studies at the core of this thesis follow the Action Research method, which commonly appears in education (Alticheter et al., 2007) and other fields of professional practice such as nursing (Holter and Schwartz-Barcott, 1993). This methodology creates an Action, or Intervention, which is carried out and then outcomes are systematically 'Researched' to improve teaching practice and inform policies.

Evidence-Based Policy often utilises a form of meta-analysis that includes a systematic review of all available evidence. However, this evidence often consists of the reviews of many separate small-scale evaluated research projects. These are produced in a 'cottage industry' (Pawson, 2006: 8) that is driven by funding demands and takes place after the implementation of policy, not at the design stage. It, therefore, has not informed policy, though it is acknowledged that "evaluation research has been one of the great successes of modern applied social research" (Parson, 2006: 8).

In contrast, some scholars (McNiff, 2013) define the "Research" element as "Action Reflection", where the practitioner (e.g. teacher, nurse) evaluates the impact of an intervention rather than systematically gathering evidence and data to measure outcomes (research).

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[6] https://futurelearnpartnersupport.zendesk.com/hc/en-us/articles/360033302894-Article-step
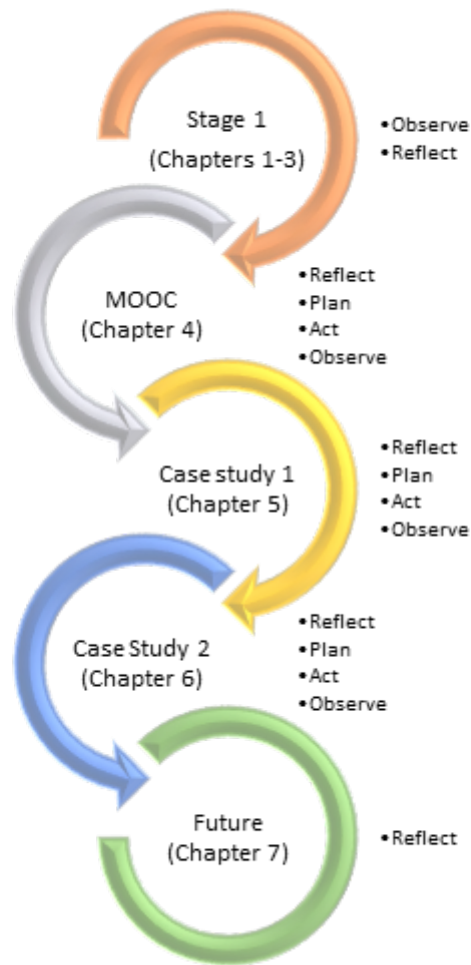
Figure 2 Action Research cycle methodology as it will be replicated in the structure of this
thesis.

Figure 2 illustrates how the model is shaped in relation to the structure of this thesis. The
first step is formed by the creation of a question to be addressed. For the purpose of this
thesis, the aim of the project is listed in Chapter 1. The development of a plan then
represents the following step, followed by the action; both are presented later in this
chapter. An observation is then carried out to evaluate the effectiveness of the
methodology, and it is followed by the reflection phase, which aims to analyse the data
collected and helps in reviewing the questions for the second cycle. The entire process is
then repeated.

For this study, I will apply a critical realism[7] approach as it is focused on solving real-world
problems and establishing successful solutions for each situation according to different

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[7] Critical realism aims to discover 'what works', but more significantly, 'what works for whom in
what circumstances and why?' (Collier, 1994).

audiences. Realist research acknowledges that 'what works' varies from place to place, across time and audience. It is clear that there is a need to evaluate/research interventions as they work in a particular context, so it needs to be understood how context plus the intervention combine to produce particular outcomes in different places with different people; hence the focus on 'for whom, in what circumstances, and why?' (Tilley, 2000).

While this chapter provides the background information on MOOCs providing a review on how digital pedagogy is applied to different educational models, the site of Portus, and visibility of the site to the British and Italian communities, Chapter 2 will present an outline of Instructional Design and Bloom's learning theories as a background to the analyses of the resources available on the Portus MOOC. Each step will then be linked to Italian learning objectives, and the results of the language analysis will be presented.

The quality of the framework and equivalences between both systems will be described and analysed in Chapter 3 while looking briefly at both educational history and recent education reforms. The aim of both sections is to provide an understanding of the political and historical facts that have influenced the current educational system and identify similarity. In this way, I hope to clarify the gaps that could be filled by the proposed methodology and research. Micro-credentials will also be presented as a tool to certify skills acquired by students participating in the pilots.

Chapter 4 will review the results from the Italian community participating in the MOOC. In this section, I will illustrate how the learners' community engaged within the FutureLearn environment and with other support platforms such as the associated blogs, Flickr and Twitter.

Chapter 5 will present the first case study involving Italian schools. It will introduce and examine how selected resources have been used for Content and Language Integrated Learning using a synchronised annotation software called Synote, a piece of research software used to engage with e-learners and to encourage collaborative peer-learning, to test blended learning. In this section, I will also illustrate how the data collection has been developed and results will be presented.

Chapter 6 will demonstrate and analyse the ways in which Italian students' feedback discussed in Chapter 5 has informed the successive data collection through the creation of a new online portal. In this instance, the students' participation was part of their compulsory work experience with an eye to support learning.

The seventh chapter will summarise the main contributions of the work and highlight its limitations and future perspectives. Attention to the longevity of digital-born content and the exploration of best practices from libraries and existing european networks will be presented and analysed further. This section will look at how the data collected can and has already led to improvements to the pedagogical approach adopted by the Portus MOOC structure.

The last chapter, Chapter 8, will conclude this work by proposing a methodological 'template' to be adopted and expanded by colleagues working more broadly in the digital scholarship space with comparable aims and needs to those explored in this thesis.

Appendix A contains a list of MOOCs and online courses created on Archaeology and Cultural Heritage from 2013 until December 2020.

Appendix B contains the surveys developed to collect student data at the beginning and at the end of the project. The data collected is presented in Chapter 4.

Appendix C contains examples of the rewritten text in English and translations in Italian for the improved readability test.

Appendix D contains the translations created by the Italian students as part of the second pilot presented in Chapter 6.

Appendix E contains the text created by the Italian students as part of the second pilot presented in Chapter 6.

1.6 Background

This section aims to provide an introduction to the main topics of this thesis, from the key definition connected to digital education, literacy and pedagogy and the history of MOOCs' development, to the way in which heritage is perceived in Europe. An introduction to the history of the site of Portus will follow, providing some background information on the evolution of the area. The chapter will close by discussing how visualisation is used in the heritage sector to present complex data using examples from a variety of sites; and the ways in which Portus has been represented to the target audience in order to emphasise the value of reusing the MOOC's content to increase heritage knowledge and engagement through in different communities.

1.6.1   Defining digital literacy, digital education and digital pedagogy

The explosive growth in the use of digital technologies for learning has left subject disciplines, government agencies and many practitioners with a problem related to the development of common policy frameworks based on shared definitions (Pangrazio et al., 2020).

Belshaw (2012) attempted to identify differences between how different countries define new forms of literacy before exploring what pedagogical approach should be used as a response. His findings suggest that literacies seem to be less about pedagogy and educational outcomes and more about individual nations' internal social cohesion (in some cases referred to as 'citizenship') and external competition (2012: 43), and that shift is reflected in each educational policy. However, in his work as an education practitioner, Belshaw (2012: 204) stated that the development of digital literacy is directly connected to digital education as a way to contextualise and tailor the learning to the student's needs. Similarly, Bawden (2008: 28) suggests "*it is not prudent to suggest a single model of digital literacy that is appropriate for everyone, or even to suggest that the same model is appropriate for the same person throughout their entire lifetime*". Taxonomies such as the one developed by Bloom (Bloom, 1956; Bloom et al.,1956) or the Structure of Observed Learning Outcomes (SOLO) Taxonomy (Biggs and Collis, 1982) can be applied as a pedagogical model (Usani et al. 2014) to embed digital pedagogy into in teaching, learning, assessment and curriculum. Pangrazio (et al., 2020) calls colleagues to focus on the tension of re-purposing critical pedagogical approaches into digital literacy frameworks that are applied to school contexts.

In 2015/16, a project to Overview and Analysis of Policies for the Integration and Effective Use of Digital Technologies in Education (DigEduPol) was commissioned to understand what type of digital education policy models have been developed worldwide and that Europe could do to facilitate integration between all the members. The outcome of the study suggests that despite many countries worldwide being concerned about improving the integration of digital technologies into education, the policies created seem to be directed towards models targeting systemic rather than infrastructure- or content-related changes (Conrads et al., 2017). However, the role of educators in supporting the integration of digital technologies into the pedagogies is recognised as crucial across the board and connected to the development of teachers' pedagogical digital competencies (Conrads et al., 2017: 28). For example, the development of digital literacy in Europe is based on the DigCompEdu reference framework (Redecker, 2017) that established six dimensions teachers should apply for the development of digital literacy in students, and it

is closely linked to their own personal development. It then appears clear why digital education policies are more sustainable and effective if they are embedded in an overarching strategy that considers the interrelation between educator's skills, pedagogical approaches used and the delivery of education, and the development of skills in learners.

Before proceeding to explore the way in which heritage is represented in the European context, this section offers a description of essential concepts of digital education, digital pedagogy and digital literacy. The definitions of the following concepts and terminology are directly linked to the pilots discussed in chapters five and six.

Digital Education is intended as the use of technologies and tools through teaching and learning and is frequently known as Technology Enhanced Learning (TEL) or digital learning.

Digital Literacy in this work is used to define the ability and skills of an individual to find, evaluate, use, share and create content using information technologies and the internet.

Digital Pedagogy is intended as the study of how digital technologies can be used to affect teaching and learning best.

These three elements are interconnected as the effective application of digital pedagogy in the development of digital education strategy would support the development of digital literacy in the final user.

1.6.2   History of MOOCs and pedagogical models applied

A Massive Open Online Course (MOOC) is a digital course aimed at large-scale participation and open access via the web (Kaplan and Haenlein, 2016). Traditional teaching materials, such as videos of lectures, articles, and practical exercises, are integrated through online communities where teachers, students, and professors can communicate in an interactive way. These traditional materials are also structured and linked together in a variety of new ways, tailored to the breadth of the target audience and to the affordances of the MOOC platform.

Despite the existence of distance learning courses such as radio and television broadcasts since the 1890s (Saettler, 1968), it was only with the increase of online materials and the development of MOOCs that this evolved to a global scale.

The term MOOC was created in 2008 by Dave Comier of the University of Prince Edward Island in relation to a course called "Connectivism and Connectivity Knowledge", developed by Stephen Downes and George Siemens (Siemens, 2013). The course wanted to develop interaction and enrich traditional teaching experience between 25 regular fee-paying students at the University of Manitoba, and over 2000 non-fee-paying online students (Parr, 2013). Interaction between the two groups happened in collaborative spaces across blogs, online discussion forums and during meetings in SecondLife[8] (Downes, 2009; Chauan, 2015).

With the development of online courses, two typologies emerged: the "cMOOC" (where 'c' stands for 'connectivist'), based on the principles of the connectivist philosophy (Siemens, 2013), and the "xMOOC" (where 'x' stands for 'extended'), that can be implemented as either traditional teaching, or an integration of other courses (Rodriguez, 2012).

Whilst the first typology (cMOOC) creates an environment where material should be aggregated and not pre-selected, re-usable and re-pursuable (Downes, 2011; Bell, 2011), and where students should be working together by replying to questions or working collaboratively on joint projects, the second (xMOOC) has a more traditional structure with a defined syllabus (primarily based on interactive media, such as lectures, videos and text) and tests to be completed individually. In this latter typology, interaction is mainly between teacher and student with a focus on exploiting the possibilities of reaching a massive audience (Prpict et al., 2015).

Following the 2011 launch of three xMOOCs[9] by Stanford University, the number of courses and topics offered has drastically increased (Perez-Pena, 2013), and 2012 was defined by the New York Times as "the year of the MOOC" with the rise of several providers associated with top universities including Coursera, UDacity and edX in the United States, and FutureLearn in the United Kingdom (Pappano, 2012; Smith, 2012).

If the initial purpose for the development of online courses was to increase the audience reached (e.g. the Stanford courses) and move to an inclusive model where everyone could have access to education (Sandeen, 2013: 39), universities are now using MOOCs to showcase their research expertise, and as a pathway to a traditional higher education degree where the course is created as a tester course for an online or face-to-face Masters degree; or integrate them with traditional campus courses in the form of blended

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[8] https://secondlife.com/
[9] The three courses were: Databases taught by Jennifer Widom, Machine Learning taught by Andrew Ng and Artificial intelligence taught by Sebastian Thrun and Peter Norvig (Ng and Widom, 2014)

learning (Baker et al., 2018; Houston, 2013; Chen, 2013) (Figure 3). In fact, the increasing use of blended learning designs has been identified as one of the most significant technological trends driving educational change in higher education institutions (Johnson et al., 2016).
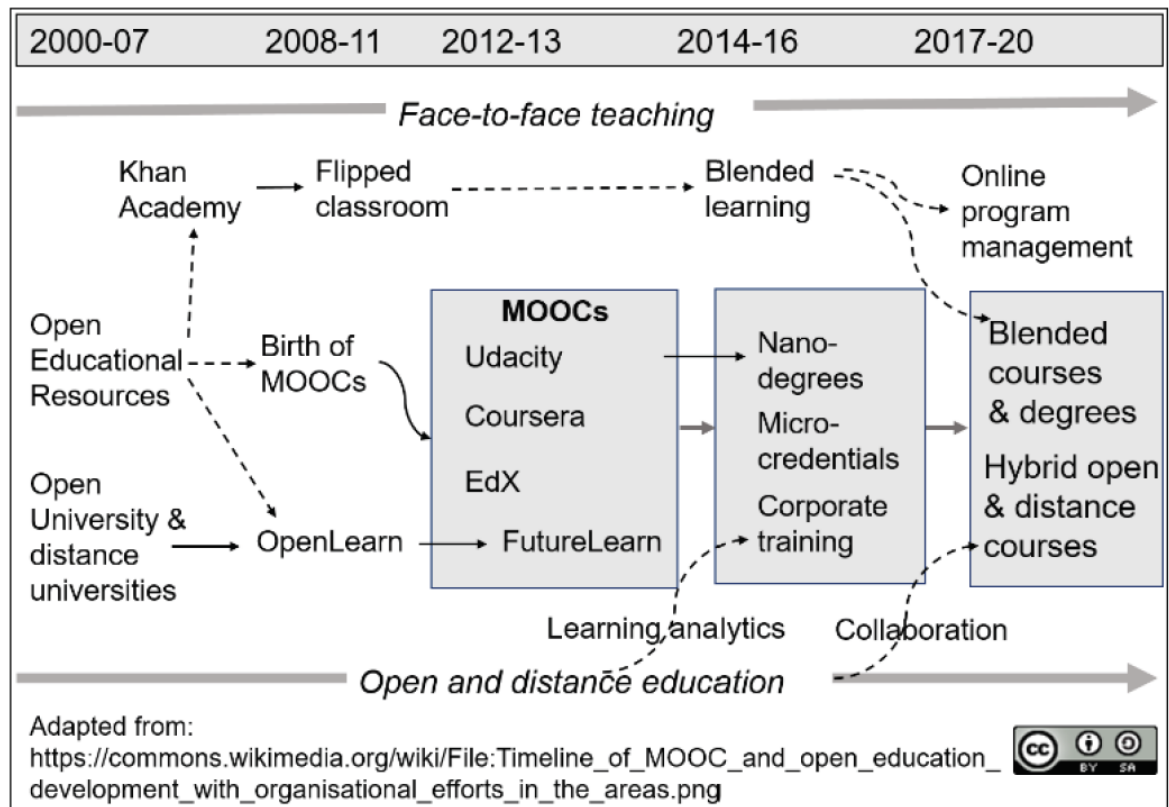
Figure 3 Development of MOOCs and Open Education Timeline (Sharples, 2019: 155)

In addition, students completing the MOOCs have been offered a discount towards enrolment to a degree programme (e.g. the MOOC developed by Southampton in partnership with the British Council[10]), or have the credit gained by completing the MOOC recognised as part of a traditional degree programme[11] (e.g. some of the MOOCs created by the Open University and the University of Leeds allow students to earn academic credits towards specific courses).

While research on MOOCs' local stakeholders has collected evidence of how the University of Southampton venture with FutureLearn started as a 'top down' endorsement

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[10] 'Understanding Language: Learning and Teaching'. The MOOC aims to be a taster course of the Online MA in English Language Teaching (see https://www.teachingenglish.org.uk/teacher-training/ma-elt). Students progressing from the MOOC to the MA qualify for a 30% discount on course fees.

[11] https://www.futurelearn.com/programs

from senior members of staff to use the platform for a marketing and recruitment exercise (White, 2014: 24-27), it also demonstrated how it impacted and changed the educational culture within the institution (White, 2014: 28-35). As a result, colleagues involved in the creation of MOOCs explored the option of embedding MOOCs into face-to-face teaching as a way to support digital education development while enriching the student experience and developing staff and students' skills.

Changes have also been made to the accessibility of contents, moving from open access[12] to promote the reuse and remixing of resources, to closed licenses of course materials. With MOOCs, students still maintain free access to the contents even if a registration might be needed (Wiley, 2012; Cheverie, 2013; Carr, 2013; Adamopoulos, 2013).

More recently, European Universities have also been exploring credit recognition and badges connected to open education, while governments and agencies in developing countries are interested in MOOCs to address skill shortages or personal development (Hadi, 2016). Opportunities in recognition of learning will be discussed in-depth in chapter 3, with the exploration of the use of open badges and micro-credentials connected to MOOCs. While some experiments have been conducted already, badges and micro-credentials are still not an established practice.

Using a specially-adapted version of the Higher Education Academy's UK Engagement Survey (UKES) 2014, the research team at the University of Southampton asked participants who had completed one of two MOOCs[13] designed, facilitated by the university, and delivered through the FutureLearn platform about their experiences as learners and their engagement with their respective MOOC (Wintrup et al., 2015: 16). The results also showed that both MOOCs successfully enabled many participants to feel engaged in intellectual endeavours such as forming new understandings, making connections with previous knowledge and experience, and exploring knowledge actively, creatively and critically. In response to the open-access approach—in which no one taking part in a MOOC is required to have a minimum level of previous educational achievement - the report showed that persistent learners engaged, regardless of prior educational attainment (Wintrup et al., 2015).

A recent development in MOOCs has been the integration of MOOCs into campus courses in the form of blended learning (Houston, 2013; Chen, 2013; Kolowich, 2013;

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[12] Features include open licensing of content, structure and learning goals.
[13] *Web Science: how the web is changing the world*, and *Exploring our Oceans.*

Sandeen, 2013; Almutari, 2018). Blended MOOCs do incorporate some face-to-face sessions, but part of the course content and activities are offered via a MOOC platform. This "blended learning" combines the advantages of technology and independent learning with face-to-face interaction (Yousef et al., 2014). Torres-Coronas and Vidal-Blasco (2018) note the flexibility of MOOCs in allowing scalability not only to the masses, but also to smaller audiences such as undergraduate students via curricular subjects. Within the higher education sector, the implementation of blended learning practices has increased drastically, making it one of the most significant trends in education change (Johnson et al., 2016: 6), despite the use of the terminology to represent a wider umbrella of different pedagogies where the space of learning was not currently a focus in blended learning design was criticised by Oliver and Trigwell (2005).

In this past pace environment, teachers might feel pressured to use MOOCs as blended teaching due to financial constraints, their budget might not allow the creation of new resources, creating a dependency from open resources that might be available for free but on limited time scales[14] and on the constant review of their teaching strategies in response to technological advancements (Chicioreanu et al., 2019).

In response to the rapid diversification of the online offer and the educational models applied, it can be argued that a binary classification into cMOOCs and xMOOC presented earlier is too simplistic, and other authors have proposed different classifications. For example, Downes (2010) proposes four criteria for classifying MOOCs: autonomy, diversity, openness and interactivity, while Clark (2013) provided the following MOOC taxonomy:

- "transferMOOCs" - identifies those MOOCs born from pre-existing courses;
- "madeMOOCs" - identifies the most innovative MOOCs, which make effective use of video and material interactive and quality-oriented;
- "synchMOOCs" - courses with a start and end date;
- "asynchMOOCs" - without start and end date and with flexible 'task' deadlines;
- "adaptiveMOOCs" - courses that offer personalised learning experiences, based on assessment and tracking of dynamic data;
- "groupMOOCs" - where the focus is on collaboration at the small group level;
- "connectivistMOOCs" - where the emphasis is on the connection within a peer network;
- "miniMOOCSs" - smaller than traditional courses massive.

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[14] Most MOOCs resources are available only during the official course run, unless the step has been made open.

Barry makes a striking comparison between three different MOOCs, in terms of: workload, technology, content, pedagogy, evaluation. (Barry, 2013).

Reich (2013), on the other hand, suggests that even the notion of a course can be controversial, depending on parameters such as: the start and end dates, learning self-regulated or guided, content orientation to or to the development of skills, nature of the interaction, certification. He then suggests that a MOOC can be defined as a book or as a course, depending on how learning occurs. However, as Conole argues (2013), these metaphors and the above classifications do not capture the variety and multiplicity of the aspects that can characterise a MOOC, as learning takes place along various lines ranging from formal to informal, independently from how the content is structured or the type of accreditation. A single MOOC can therefore be placed in any point on these lines: can be used by a single individual who wants to deepen some aspects and use part of the MOOC as a learning module (therefore in the context of a learning informal which does not necessarily require the use of the entire course (Polites, 2009; Evans et al., 2016; Siemens et al., 2013), but for another student it does, on the other hand, the same course can be part of a formal education process.

A report by the Department of Education in June 2014 entitled '*MOOCs: Opportunities for their use in compulsory-age education'*, surveyed teachers, headteachers, and MOOC experts' attitude to, and assessment of, challenges in the educational sector in UK school-age learning (11 to 19-year-olds). The study indicated that most teachers do not have enough familiarity with or understanding of MOOCs to be comfortable using them, would not be able to develop their own material, and that there are few courses available that are suitable for school-age learners (DtE, 2014: 68-74). The study also suggests that younger students would only use the information to integrate school classes instead of proactively using MOOCs for their independent learning because they still require some support to find resources and analyse them analytically (DfE, 2014: 44;72).

Unfortunately, no similar study has been conducted in Italy, and a direct comparison is not possible at this time. Despite this preliminary study, no further research has been published on the integration of MOOCs into compulsory age education in England. A history teacher in England has informally confirmed to the author some reluctance to change a teaching curriculum that was "*achieving high grades to his students at A-Level*". Therefore, there is a clear correlation between students' performance and curriculum structure in England.

There is only one documented case in Italy defined as a "high school online course" (Canessa, 2016), where students from a school were able to watch, at their own pace, their physics and mathematics lessons held in the classroom. The study has proven improvements in students' performance in a short period (Canessa, 2013). Despite this being classified as an online course, it is not comparable with a MOOC that is designed using digital learning as key pedagogy. This case study is comparable to the development of Synote at the University of Southampton, where recorded lectures were similarly made available to undergraduate students on the Synote platform (see Chapter 2).

If the use of MOOCs in school-age education has been explored in a limited way in the United Kingdom and Italy, it has been extensively researched in the United States since 2004. Online and blended learning in K-12 schools (17 to 19-year-olds) is focused mainly around STEM subjects[15]. The research has also shown that it is not particularly effective in improving students' performance in the long run. It was argued that blended learning required more learning time, and this could be one of the factors influencing student performance (Picciano and Seaman, 2007; Means et al., 2013). There are no research studies on the use of online and blended learning in the humanities. I firmly believe that as blended and online learning promotes interaction and collaboration among learners (Means et al., 2013: 36), archaeology could be a perfect area of application due to its interdisciplinary nature.

As mentioned earlier, Conole (2013) proposes a different and more complex classification, which takes into account twelve dimensions (Table 3): the degree of openness, the level of participation, the use of multimedia materials, the levels of communication, the degree of collaboration expected, the type of path (student-centred or more teacher and highly structured), the level of quality assurance, the degree of encouragement for reflection, evaluation, the degree of formality, autonomy and diversity. I propose to include an additional dimension to represent the digital sustainability of the content produced.

However, in this contribution, the twelve dimensions are also used as a key to understanding a particular context (the heritage), with the aim of reflecting on the contribution that MOOCs could have on the sector. By applying this classification to heritage MOOCs, as we will see below, we will be able to grasp the essence of the courses, and the different pedagogical models applied.

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[15] STEM Subjects include science, technology, engineering and mathematics.

DIMENSION	DESCRIPTION
Open	From relatively closed courses, to courses created using 'open source' tools where the participants are encouraged and share their products using licenses creative commons.
Massive	From small groups to courses involving thousands of participants.
Use of multimedia	From a scarce use of multimedia materials to a high one of interactive multimedia.
Degree of communication	From a low level of communication to courses in which participants are encouraged to contribute in large numbers debates on the forums, to keep a personal blog of reflection, etc.
Degree of collaboration	From little or no collaboration, to courses with significant levels of collaboration.
Learning pathway	More or less structured, more or less personalised paths, etc.
Quality assurance	From little or no quality assurance to courses that undergo revisions upstream of delivery.
Amount of reflection	From little or no reflection to high incentive courses levels of reflection.
Certification	Whether or not attendees can receive badges upon completion of individual aspects of the course or if they receive a certification for participation.
Formal learning	From a formal training offer to proposals for informal learning.
Autonomy	Degree to which participants are required to work autonomously and to self-regulate own learning.
Diversity	From homogeneous student groups to very different students.
Digital Sustainability	Whether or not content is accessible long term.

Table 3 Table describing the classification proposed by Conole (2013) articulated through twelve dimensions. The classification has been expanded to include Digital sustainability as an additional dimension.

In order to reflect on the impact of online courses on the heritage context, it is necessary to explore the extent to which heritage content has been presented online. Over seventy courses have been produced since 2012 by different national and international providers. The list included in Appendix A List of courses and resources created on

Archaeology and Cultural Heritage from 2013 until December 2020

explores only the courses with at least one instance in English, Italian or French[16] still accessible in any form. From the data collected, it seems there has been a steep increase in the production of heritage courses after 2016, in parallel with the wider adoption of online courses. The topic of the courses also seem to have shifted from content covering Egyptian, Romans and Classics (which are popular amongst a wider community) to a more general heritage focus (e.g. *Cities of Yesterday, Today and Tomorrow: Why Heritage Matters*; *Cultural Heritage and the City*), a specific event (e.g. *The Battle of Dunbar 1650*; *Agincourt 1415: Myth and Reality*) or collection (e.g. *La sculpture grecque d'Alexandre à Cléopâtre*); or to a specific field of study (e.g. *Forensic Archaeology and Anthropology*).

Below I analyse a sample of the online resources with a focus on heritage to illustrate how they can map to the dimensions presented in Table 3 and how they related to the MOOC on Portus:

1. *Roman Architecture*[17] course is an introduction to roman architecture delivered as face to face teaching at Yale College campus. The course is formed by the recordings of the 75 minutes lectures delivered by the academic lead in 2009 uploaded on Open Yale course. The online course structure replicates the one delivered on campus over nineteen sessions. Bookmarks are used to divide each video into sections, called chapters, to facilitate the student's navigation of contents. The platform offers different download options (transcript and audio or video for low and high bandwidth) to increase the accessibility of content. Learners are not encouraged to share any of their reflections or contributions, and there is only a reference to specific assignment requirements relevant only to students enrolled at Yale as part of a degree. In 2014, an interactive e-book featuring chapters overviews for the most significant time periods, sites, and monuments and concise interpretations of the most important buildings in the Roman Empire, illustrated in over 250 photographs and site plans, was released as an integration of the online course. The book includes all the resources mentioned in the lectures, and it is presented primarily through the professor's digital images. Above all, these custom created resources make learning more effortless than ever with

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[16] These represent the languages known by the author to allow a classification of the content.
[17] https://oyc.yale.edu/history-of-art/hsar-252

maps, pop up references, visual book navigation, geolocation links, flashcards, and recommendations for further reading.

2. *World heritage*[18]. This free course offered on OpenLearn[19] is articulated in four sections to provide an overview of world heritage and its relationship with UNESCO and the World Heritage list conventions. It is promoted as a sample session of Level 2 courses offered by the Open University, that pioneered distance learning in the UK. The course is based on open resources and has clear learning objectives. However, it presents no interaction between learners, who are suggested to complete the activities individually in addition to a personal Learning Journal. A limited number of images are embedded in the course only in relation to the three case studies present and an audio case study. It needs to be noted that the audio player is not available on the website, and the file has to be downloaded and played locally. The course is available as a download in a variety of formats (e.g. Word, Pdf or Html), and it is released under the terms of the Creative Commons Licence v4.0[20]. A free statement of participation is offered on completion upon registration on the website.

3. *Archaeology's Dirty Little Secrets[21].* This not credit-bearing course, developed by Brown University, was divided over eight weeks on Coursera. It needs to the noted that the course is not available anymore[22], and the social media channels (Facebook[23] and Flickr[24]) created at the same time are the only resources still available with the article published detailing the educators' experience (Alcock et al., 2016). The course was the first to be designed as an introductory class to archaeology, similarly to the one created briefly after that by the University of Southampton and Newcastle. The videos used were shot in the office of one of the lecturers, as it would have happened on campus, and used to introduce the topic of each section. Students were also recorded while handling objects and describing them to replicate what would have happened in a classroom. Only the promo video remains available on Coursera's YouTube channel. Quizzes and discussions were used to engage with the audience.

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[18] https://www.open.edu/openlearn/history-the-arts/history/heritage/world-heritage/
[19] The Open University online platform.
[20] https://creativecommons.org/licenses/by-nc-sa/4.0/deed.en_GB
[21] http://www.coursera.org/course/secrets please note this link is not accessible anymore and information about the course have been obtained from the publication of Alcock et al. (2015).
[22] The disappearance of the content might be related to the migration of coursera on a new platform in June 2016 (Coursera, 2016). Information related to the migration is here: https://www.edsurge.com/news/2016-06-13-coursera-s-update-will-eliminate-hundreds-of-courses
[23] https://www.facebook.com/archsecrets/
[24] https://www.flickr.com/groups/archsecrets/pool/

4. *The Archaeology of Portus.* The six weeks FutureLearn course was developed by the University of Southampton to present the site of Portus and the methodologies applied during the project to anyone fascinated by archaeology, history or new technologies. Videos, some of which are still available on YouTube and Vimeo, were used to introduce a new topic of technique or to replicate the experience of being on an excavation. Lead academics and students commented and described finds or how methodologies were applied on site, providing a direct link between research and direct divulgation of content. In addition to images, maps and videos, virtual tours and 3d models were used to present the content in different formats and for different audiences (e.g. photos of objects are used to document the record while the tours are used also facilitate access to information when visiting the site). Although the course has been archived, the steps were made open and are still available online. However, some of the interactive content produced, specifically the app and the first tour, is not available anymore, demonstrating limits to the sustainability of the content created. Learners were invited to engage and reflect with the content provided on FutureLearn (using quizzes and discussion) or on one of the many social media platforms used (e.g. Twitter, Flickr, blogs) to support interactions between learners and the wider community. The MOOC content was also mapped against the University curriculum to ensure the content could have been used in a blended context.

5. *Hadrian's Wall: Life on the Roman Frontier[25].* The six weeks course created by Newcastle University and hosted on FutureLearn, followed a similar structure from the one used by the University of Southampton and Brown University. The course was open to everyone with interest in the topic. Videos were used to introduce a new topic, and it included footage from the sites and from the university campus, where finds were presented and commented on by the lead academic. Detailed case studies have been used to illustrate the different features of the Wall and its surroundings, considering the way in which the frontier system evolved throughout the Roman period. The content is still available, even if the course has been archived on the platform, as the steps were made open. In addition to images, a series of interactive visualisations (see section 1.6.5) have been linked to the course to introduce users to different interpretations of the same site. Similarly to the Portus MOOC, there is a direct link between research projects and the course (Fieber et al., 2017: 301). Quizzes and discussions have been included to support

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[25] https://www.futurelearn.com/courses/hadrians-wall

learners' reflections and peer learning in line with the FutureLearn design approach (see section 2.3).

6. *Using aerial photography for archaeology heritage management*[26]. This course, developed by Historic England using the learning application called Articulate Storyline[27], is part of a series of e-learning modules supporting other essential and heritage practice programmes. Heritage professionals are the target audience of this resource, and the course has no indication if any certification will be obtained at completion. The course is articulated in a series of sections the learner needs to follow in a pre-defined order. Images are used in quizzes at the end of each section, where learners are invited to interpret each image and reply to the questions individually. Solutions with explanations are offered at the end of each quiz or after submitting five consecutive wrong answers to the same question. There is limited interactivity created by the quiz and no indication of how the material can be reused. The use of Articulate Storyline also limit reusability as a licence is required to access the file.

7. *Remaking Material culture in 3D*[28]*.* This online, open-access teaching and learning material is structured across four different units to develop participants' knowledge of the theory and practice of digitising material culture by producing computer generated and printed 3D models. 3D digitisation and 3D printing are presented both theoretically and practically, discussing the history and the state-of-the-art, best practices and protocols, and typical applications from various fields. The course includes videos and interactive 3d models and panoramas directly on the #dariahTeach platform to maximise engagement with the material used to explain key concepts and demonstrate processes. Differently from the other MOOCs, videos included have not been explicitly created for the course, but the academic who developed it has repurposed videos already available on Youtube to introduce key concepts. Throughout the course, participants have the opportunity to test their knowledge via quizzes and interactive assignments designed using H5P[29], an open-source content collaboration framework based on JavaScript that allows other learners to share and easily reuse the interactive content created. There are also many reflective moments in which learners are asked to think about controversial aspects of 3D digitisation, respond to scenarios, and provide

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[26] https://rise.articulate.com/share/HmSqz0fHn0V4OaQ_6mQ3Ga5LBkby35bP#/
[27] https://articulate.com/
[28] https://teach.dariah.eu/course/view.php?id=55
[29] https://h5p.org/

solutions. Participants are encouraged to share their learning outputs using the creative commons license

This module is designed as a 5 ECTS unit part of a 20 ECTS course entitled *Design Thinking & Making in the Arts and Sciences*[30] and delivered within Masters programmes at the Aarhus and Maastricht Universities. Each 5 ECTS unit is designed to be used by teachers within their classroom practice (either by exporting the units or module to their institutional instance of Moodle or by directly registering their class on #dariahTeach) or by individuals through the #dariahTeach platform.

8. *Digital Education with Cultural Heritage*[31]. Developed as a partnership between Europeana and European Schoolnet, this course is addressed to teachers and educators who wish to include digital technologies in their everyday educational activities. It explores the educational potential of digital cultural heritage so that teachers, museums and other non-formal educators can efficiently integrate it into their lessons and practices, regardless of the subject they teach or the setting of their learning activity. This is the first course to support teaches' personal development in teaching cultural heritage with digital technologies. The platform presents a simple interface where external links are kept to minimal. Interactions between learners are encouraged in particular spaces where other collaborative tools are embedded on the platform (e.g. participants are invited to introduce themselves on an embedded Padlet) but limited to introduction and essential exchange of information, while the actual discussion on pedagogical approaches is encouraged on the pre-existing platforms used by the networks. This appears to be an optimal way to grow an established and thriving community sustainably. The videos included are five minutes long as average, hosted on YouTube, and used to introduce a case study.

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[30] https://ignite.acdh.oeaw.ac.at/ignite-module/
[31] https://www.europeanschoolnetacademy.eu/courses/course-v1:Europeana+Culture_EN+2020/about

	Roman Architecture	World Heritage	Archaeology's Dirty Little Secrets	The Archaeology of Portus	Hadrian's Wall: Life on the Roman Frontier	Using aerial photography for archaeology heritage management	Remaking Material culture in...
	Yale University	Open University	Brown University	University of Southampton	Newcastle University	Historic England (HE)	Universit... Maastri...
First year of running	2009	2012	2012	2013	2014	2020	2020
Platform	Open Yale	OpenLearn	Coursera	FutureLearn	FutureLearn	Articulate on HE website	DariahTe...
Topic	Heritage	Heritage	Archaeology	Archaeology	Archaeology	Archaeology	Digita... Humani...
Open	Medium/Low	Medium/High	Medium/High	Medium/High	Medium/High	Medium/High	High
Massive	Low	Medium	Medium	Medium/High	Medium	Low	Medium/...
Use of Multimedia	Medium/Low	Low	Medium	Medium/High	Medium/High	Low	High
Degree of communication	Low	Low	High	High	High	Low	Medium/...
Degree of collaboration	Low	Low	Medium	Medium	Medium	Low	Mediu...
Learning pathway	High	Low	Medium	Medium	Medium	Low	Mediu...
Quality Assurance	Medium	Medium	High	High	High	Medium	High
Amount of reflection	Low	Medium/Low	High	High	High	Low	Mediu...
Certification	Low	Low	Medium	Medium	Medium	Low	Low
Formal learning	High	Low	Low	Medium/High	Medium	Low	High
Autonomy	High	High	Medium	Medium	Medium	Medium/High	Medium/...

Starting from the first dimension that considers the degree of "openness" of the course, as can be seen from the table (Table 4), courses taken as an example are based on open materials. All the courses do offer some content that is available to everyone; for example, FutureLearn offers the opportunity to make all the sections of the course (steps) open and accessible without a registration on the platform (Chastney, 2016), without retaining the structure of the course. However, the possibility to navigate the content as structured by the lead academic is only available after having logged into the platform. This functionality is common to all courses hosted on FutureLearn and on Coursera. However, only the course "Remaking Material culture in 3D" is designed and delivered as an open educational resource (OER), where contributor-instructors using the #dariaTeach platform are encouraged to use open-source software, to create their content in open access formats, and to provide clear and shareable copyright. Additionally, modules should be open and extensible in order to allow reuse. This show a step forward in the creation of online educational material. Overall, all the examples show that a medium to a high degree of openness can be achieved independently from the platform used and easily achievable independently by instructors. This contrasts with what was stated by Pozzi (Pozzi and Conole, 2014), who suggested that the creation of an open MOOC should not rely on individual initiatives but be based on an institutional approach. While I agree an institutional approach can facilitate conversations and support staff creating OERs, I firmly believe each instructor is also responsible for creating open content.

The degree of "massiveness" has to do with the number of participants; most of the cases presented potentially lend themselves to involving a high number of participants since the access to the content is free (if registration is required, no cost is involved), the language used is English, and the courses are open to all those who are interested in the topics covered. However, courses like the one offered by Yale University, Historic England and Europeana are designed to support specific audiences of students enrolled in a degree, heritage practitioners, or teachers who wanted to use a pre-existing platform in their teaching. More generally, this aspect is also strongly influenced by the language in which the course is offered: if it is in Italian, the course will practice less strength of attraction, while an English course has a more significant number of potential users (Pozzi and Conole, 2014: 180). The *Archaeology of Portus* MOOC is the only one to offer an integrated bilingual experience through the blogs and the transcript of the videos where learners can easily switch between languages or watch a video in English with Italian subtitles. Furthermore, the course developed by Europeana has been completely translated into other languages (French, German, Spanish and Italian), and #dariaTech

offers some courses in another language rather than English. While the entirety of the content is offered in a different language, the learner cannot move across versions reducing the possibility for more international communities.

Another important aspect is the "multimedia" of proposed materials: as we have seen, the quality and type of the interactive and multimedia content vary from a limited amount of images used in the *World Heritage* or the long videos of the *Roman Architecture* course to the mixed media used by the *Archaeology of Portus, Hadrian's Wall* and the *Remaking Material culture in 3D* courses where a series of 3D models, panoramas, apps and virtual tours are used to integrate videos and images used through the course. It also needs to be noted the difference in duration between the videos offered by Yale University (75 minutes) and the ones offered by the other courses that are no longer than 5 minutes.

Concerning "communication", electronic communication tools (both synchronous and asynchronous) are quite widespread; therefore, this aspect should not represent a particular obstacle. For example, courses hosted on FutureLearn and Coursera are designed as catalysts of pedagogical innovation and open to more constructivist-social approaches (Ossiannilsson et al., 2016; Ryan and Tilbury, 2013:26), the communication is not only encouraged on the platform and participants are also invited to contribute and join other discussion groups formed on other social media integrating the course such as Twitter, Blogs, Facebook or Flickr (Sharples and Ferguson, 2019:7). Digital Education with Cultural Heritage course is innovating this dimension embedding collaborative platforms such as Padlet[32] in the course and use it as a space for discussion.

The range of communication channels also used for "collaboration", however, is somewhat limited in the four examples (Yale University, Open University, English Heritage and Maastricht University) presented where the interaction is mainly between the students and the online material, while the exchange between peers is not particularly encouraged or allowed on the platforms. This is mainly due to the fact they are courses used to integrate other learning experiences where peers interaction is occurring (e.g. face to face or on Moodle).

All the "learning paths" analysed are divided into sections called 'modules' if hosted in Europeana, 'lectures' on Yale University Online, 'units' on #dariahTeach or 'weeks' on the courses hosted in FutureLearn and Coursera. If students take advantage of the course during the 'official' provision (run) period, the activities are timed in this sense. On the contrary, if students benefit from the course in retrospect, they can follow their own path of

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[32] https://en-gb.padlet.com/

learning, deciding which aspects to deepen and which to leave out and what times to follow the course. However, they might experience a limited engagement with other learners. Only in the case of the course developed by English Heritage, the student is unable to jump from one section to another one without following the order created by the instructor.

Concerning the "quality", scepticism over the quality and the learning methodologies applied to MOOCs has been discussed by Lowenthals and Hodges (2015: 85) and Margaryan (et al., 2015), exploring how the approach offered by platforms like Coursera and edX, based on professionally produced videos with minimal instructor contact if perceived differently to a course that offers direct interaction with the lead academic. While Lowenthals and Hodges (2015) point out that MOOCs do not be fully meet some quality standards (in this particular case, the Quality Matters Rubric Standards with Assigned Point Values), they also recognise the innovative nature of online courses (Ossiannilsson, 2016) in testing new pedagogical approaches and the different reasoning behind their creation (e.g. tester session, accredited training or integration with a university module). Straumsheim (2014) also presented the view of the Chief academic strategist at Coursers that clarified the partner universities are accredited to publish content, but that leaves them the responsibility of quality control. Some basic guidelines identified so far in the literature are to set quality levels, work in teams, test before learners do, allow feedback after release and pay attention to external quality assurance frameworks (Rosewell, 2015; Rosewell and Jansen, 2104), but the application of established Quality Assurance Frameworks is pivotal to ensure quality is maintained (Poce et al., 2019). All content produced by Universities is subject to periodic monitoring and evaluations that occur prior to each run of the course. However, obviously, the aspect of the massiveness of MOOCs imposes new imperatives and sets new challenges concerning the criteria to be considered, for example, the level of support offered by the educators or the accessibility of the resources used. Universities are usually managing this quality assessment process internally, at the time of the development of the course, supporting the academic leading the development of the course from the planning phase to ensure the content utilised meet copyright, accessibility and quality standards approved by the university and host platform (Borthwick, 2021). The information is collected to create a digital asset register that highlights the complexity and decisions made through the design process. In the case of the University of Southampton, all digital asset registers created are archived by the library and the legal service team to ensure all appropriate checks took place, and the decision-making process is preserved appropriately. #dariahTeach provides a different approach, where learning objects are tested with peer

communities following a cycle of three iterations (Huang, 2017). In the case of the course developed by Historic England, the process that led to the creation of the training is not transparent to the broader community, but as the public body looking after England's historic environment that offers already other training, the quality of the content produced is intrinsic.

Comparing the level of "reflection" requested within the courses, not all courses analyses seem to include this aspect into their pedagogical approach, nor is the use of self-reflection tools encouraged (for example, blog, etc.). More generally, the absence of incentives to reflect on one's training path seems to be connected to the pedagogical approach taken. In courses designed to complement a traditional face to face delivery (*Roman Architecture, Using aerial photography for archaeology heritage management, Remaking Material culture in 3D* courses), the reflections would happen on campus with a flipped-classroom or blended approach and on the online platform. In one case (*Digital Education with Cultural Heritage*), the reflection is closely linked to a reflective action, where learners are invited to reflect on their own practice as educators and apply new tools or pedagogical approaches to their teaching.

The courses hosted on platforms such as FutureLearn, Coursera or edEx offer an end of course certificate in exchange for a fee, while the others do not offer the "certification". However, in some cases (*Roman Architecture* and *Remaking Material culture in 3D)*, the material was developed in connection to credit-bearing modules offered as formal learning at each institution. Only the two courses hosted on FutureLearn have the potential to be used to integrate the formal learning offer (see the mapping of the learning objects of *The Archaeology of Portus* MOOC included in Table 7) while still offering certification to any learner on the platform.

In three cases (*Roman Architecture*, *World Heritage*, *Digital Education*), learners are expected to use the material offered online in complete autonomy, and the courses are presented as a series of lectures, as a tester course or as a personal development opportunity. In all the other instances, learners are offered a degree of autonomy in the learning in addition to some structure of the content and facilitation offered during the period of the course. For example, the courses hosted on Coursera (*Archaeology's Dirty Little Secrets*) and FutureLearn (*The Archaeology of Portus* and *Hadrian's Wall*) offered the content structured over several weeks, with facilitation provided during each run at the end of which learners maintained access to the content to support a self-paced learning model.

With respect to the degree of user "diversity", it is reasonable to think that this varies depending on the richness of the training offer and also on the degree of formality/informality could be quite variable depending on the courses available. In the case of the MOOCs analysed, only three courses have been aimed at particular types of learners with specific pre-requisites listed on the website (e.g. Being a student registered at the University of Yale, being a teacher of cultural heritage or a heritage professional).

Finally, with respect to the degree of "sustainability" of the content, it is notable a shift from content entirely hosted on one specific platform to a move to a multi-platform approach, as noted by van Dijck (2013: 131) in relation to the use of platforms that are considered as 'archives' by users. Across all the courses analysed, there has been an increase in the use of widely adopted social media platforms to host content such as photos (e.g. Flickr was used by the *Archaeology's Dirty Little Secrets, Archaeology of Portus, Hadrian's Wall MOOCs*), reconstructions or other narratives (e.g. the application used by the *Hadrian's Wall* and the tours and blogs created for the *Archaeology of Portus),* the interaction between learners (e.g. Padlet used in the *Digital Education with Cultural Heritage*) and videos. Since 2013, YouTube seems to be the platform adopted by all courses, if a video has been used. Scholars have argued that YouTube is part of a "media-ecology" (Paolillo, 2008: 1) that nicely integrates with other media and arises from the matrix of culture (van Dijck, 2013: 131) and has no direct cost implications for storing the content. Despite assertions that YouTube is an archive (Pearce-Moses, 2005: 29-32; Prelinger, 2009), archivists recognise it as an access platform (Prelinger, 2009; Theimer, 2014; Theimer, 2012; Hackman, 2011), that will require some more established link to archives for permanent preservation and thus have a permanent location for citation by scholars (Mattock, 2018). Similarly, the use of licensed software (such as Articulate Storyline) or the creation of applications and blogs still presents long term preservation issues that could be mitigated with the development of appropriate links to archives. In the case of the course developed by the University of Yale, the publication of a book supports the sustainability of the content that would be available in another format if the online course were archived. However, this will limit the openness of the content as it is not available as open access publication. The course developed by Brown University demonstrates that even when using a platform developed to host online educational content such as Coursera, the resources created can be removed easily, leaving no trace. Out of all the courses analysed, *Remaking Material culture in 3D* embraces better long-term sustainability thanks to the inclusion of clear information to promote the reuse of the content, the application of open educational resources principles and a structured archive of learning objects.

1.6.3   Heritage in the European context

Given the focus on heritage and on the English-Italian context of this thesis, it is important to understand not only the development of MOOCs but also the European and local cultural context in which online heritage courses are created.

Culture is an integral part of an individual's past and the memory of a territory; it is a tool for identity creation and personal growth, driving creativity and innovation. In recent years, it has also been noted as a means of creating more cohesive societies promoting social integration (Da Milano, 2009), and strengthening persistent learning processes in non-formal contexts (Gibbs et al., 2007). In addition, the act of moving and settling in a territory is also one of the central factors in the relationship between economics and culture creation (Santaga, 2014). The process of cultural production is in fact, by its very nature, an expression of a community or an encounter between different cultures in a given historical and geographical context, and it is often impossible to reproduce in a different place the combination of factors that made it possible to realise that particular cultural product.

This indissoluble bond between the goods, the context in which they are created and where the communities are located is particularly evident in a country such as Italy, characterised by not only a rich cultural heritage but also its capillary-like diffusion throughout the country. The size and the extent of Italian patriotism make management complex, which transversely intersects the economic activities, politics and the transformation of the territory, and involves many public and private actors (Viroli, 2020). The culture of material and immaterial culture created in a specific area is, therefore, much more than a collection of the memory of the past (Da Milano and Sciacchittano, 2015). It is a common good, a shared resource that citizens and members of the community must have access to, to build a future that is economically viable and socially fair and sustainable, as evidenced in the message from the European Commission (COM, 2013: 9):

"*The cultural, material and immaterial heritage of Europe is our common wealth: the legacy of the generations of Europeans who preceded us and our legacy to posterity. It is a patrimony of invaluable knowledge and a valuable resource for growth economic, employment and social cohesion, enriching the lives of hundreds of people millions of people, is a source of inspiration for thinkers and artists and driving force for ours cultural and creative industries. Our cultural heritage and the way we preserve it and valorisation*

are a determining factor in defining Europe's position in the world and its attractiveness as a place to live, work and visit."

In the international debate, cultural participation is defined as a human right (Universal Declaration of Human Rights, art. 27; International Convernat on Economic, Social and Cultural Rights, art. 15) and as an essential tool for personal development, creativity and well-being. It is also regarded as a critical factor for the sustainable valorisation of cultural heritage since it promotes greater awareness of its social and economic value. It develops the conviction that, in order to take care of our heritage, it is necessary to invest in the cultural capital and society of a territory, promoting its regeneration; otherwise, its transmission to the next generation is impossible. Capital is generated when interventions in cultural heritage are opportunities to promote democratic participation in decision-making processes, diversity and intercultural dialogue. It can also strengthen the sense of belonging to a community, the understanding and respect among peoples, and can contribute to reducing disparities, and facilitate social inclusion and intergenerational dialogue.

Governments are now looking at how to activate 'virtuous circles' around places of culture, enhancing the role of knowledge centres and creative incubators and social innovation. In order to achieve this, it is necessary to build multiple bridges between those that have long been considered separate dimensions, to fill the gap between the physical and intangible dimensions, between the heritage and cultural and creative industries of a territory. All this will stimulate the entire cycle of cultural creation/production/conservation and interaction with communities, both those physically present on a territory as well as virtual ones[33].

The European policy guidelines reflect this new vision, from the Council of Europe Framework Convention on the Value of Cultural Heritage[34], recently signed by Italy, to the

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[33] See the international conference: "*Patrimonio culturale come bene comune. Verso una governance partecipativa del patrimonio culturale nel terzo millennio*", Venaria Reale, Torino, 23 – 24 September 2014, organised as part of the Italian Presidency semester europea.http://www.beniculturali.it/mibac/multimedia/MiBAC/documents/1411369321904_Conferenza_Patrimonio_culturale_come_bene_comune,_Torino,_23-24.09.2014.pdf

[34] The Convention (STCE No. 199), opened for signature by the Council of Europe Member States and on accession of the European Union and non-member States on 27 October 2005 in Faro (Portugal), became active on 1 June 2011. It was signed by Italy on February 27, 2013. It is the latest International Cultural Convention that assumes the knowledge and the use of cultural heritage fall within the rights of the individual to take part in the cultural life of the community, and to enjoy the arts as sanctioned in the Universal Declaration of Human Rights (Paris 1948), and guaranteed by the International Covenant on Economic, Social and Cultural Rights (Paris, 1966). The Convention does not overlap with existing international instruments, but it integrates them by calling on populations to play an active role in recognising the values of cultural heritage. It also invites states to promote a

most recent cultural policy documents of the European Union (Sciacchitano, 2015a): the conclusions of the Council of Ministers of Culture of the European Union on the Cultural Heritage as a strategic resource for a sustainable Europe (GUCE n. C 183/36, 14 June 2014), and Participatory Heritage Governance (GUCE n. C 463/1, 23 December 2014), and the Communication from the European Commission Towards an Integrated Approach to cultural heritage for Europe (COM, 2014, 477 final).

The involvement of the various actors in the enhancement of heritage through new models of participatory governance has also been examined (GUCE n. C 463/4 23, December 2014). This theme has been addressed through a platform of cultural cooperation between EU Member States, the Work Plan for Culture 2015 – 2018[35] (Sciacchitano, 2015b), and in the dialogue among the bearers of civil society interest in the cultural sector and the European Commission called "The Voices of Culture"[36].

A new economic and social framework is, therefore, redesigning public policies, through local and global plans, and looking at forms of involvement beyond just standard access to information. Visitors are recognised as critical players in cultural museum projects and cultural heritage; involving the public is a priority for the European Commission as well as for most cultural organisations and public administrations, not only in Europe, but in the world. There is evidence of growing attention towards the engagement of different types of audiences[37]; which is a central theme in the European support programme to cultural and artistic sectors as part of the "Creative Europe 2014-2020" programme. In addition, cultural institutions are increasing the promotion of their educational and social roles, increasingly oriented towards responding to specific public needs, framed in the local context. At the same time, cultural organisations are experimenting with innovative management models, and taking on new responsibilities with the aim of diversifying their visitor policies.

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process of participatory enhancement, based on the synergy between public institutions, private citizens, associations, and subjects which the Convention (Art. 2) defines as "heritage communities". This term defines "sets of people which attribute value to the specific aspects of cultural heritage that they desire in an action publicise, support and transmit to future generations". www.beniculturali.it/mibac/export/UfficioStudi/sito-UfficioStudi/Contenuti/Pubblicazioni/Volumi/Volumi-pubblicati/visualizza_asset.html_917365394.html

[35] The Work Plan for Culture 2015-2018 has set up two working groups aimed at identifying innovative models for participatory governance of cultural heritage, and standard lines for the development of the public through digital means.

[36] Four of the themes chosen for the new season of the "Dialogue" structured with civil society are aligned with the priorities of the Work Plan for Culture 2015-2018, in order to maximise synergies and dialogue between the different levels on the issues under discussion. Session topics included "Audience Development via Digital Means" and "Participatory Governance of Cultural Heritage".

[37] In October 2012, Education, Audio-visual and Culture European Agency (EACEA) dedicated a conference to the theme of audience development (http://www.cultureinmotion.eu/European-Audiences/index.jsp).

Data available on cultural participation[38] in Europe show, in fact, that much work has to be done, given that a significant part of the European population still does not participate in popular cultural activities, and that people in disadvantaged situations (with respect to their economic resources and education) are much less involved than people with higher education and a better economic situation. The experts of the European Working Group on policies to promote access to culture suggested that this is also a matter of fairness in terms of the redistribution of public funds, as the cultural offer by publicly funded institutions often benefits only a small segment of the population (European Working Group, 2012).

In particular, the Eurobarometer Survey of the European Commission on Cultural Heritage (European Commission, 2017: 7) shows a stability in the data on general consumption of "heritage and culture" in the European Union (European Commission, 2013:15) with a high level of diversity at country level. Considering the index of cultural practice, 49% of Italians (+9% over 2007) have "low" practice, compared to a 34% EU average, and only 8 out of 100 have a "high" or "very high" interest in cultural products (European Commission, 2013). Compared to 2013, the number of those visiting monuments or sites (+9%) or museums (+13%) across Europe had increased while the visits to libraries and archives had decreased (-1%) (European Commission, 2017:48). The Eurobarometer Survey (466, 2017) provides also information divided by age groups, suggesting that those aged 15-24 are the group (68%) that have visited the most a monument or site in the12 months prior to the survey. The UK had a reasonably high level of cultural engagement, with a "very high" score of 26% (European Commission, 2013: 45). The same trend is confirmed by the most recent survey measuring engagement with the cultural sector in 2017/18. There is almost a 10% increase in UK engagement with heritage sites, museums/galleries and arts since 2005/06, but data suggests a slight downward trend (between 2% and 3%) in the engagement rates over the following 12 months period (Department for Digital, Culture, Media and Sport, 2018). Only 20 Italians and 45 British nationals in every 100 have declared their use of the internet for viewing general cultural heritage content and 14 Italians and 22 British nationals have used it after visiting museums to improve their general heritage knowledge. While the Italian average is below the European average of 31 for the general information gathering and 19 post visit, the British are above the European average but behind Sweden and the

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[38] In particular, reference is made to the data on the participation of residents and not tourists. The theme of 'access to' and 'participation in' culture are not related to the dynamics of cultural tourism, but rather those that concern aspects such as cultural identity acquired and strengthened through culture, and the development of social and cultural life in the broad sense of the resident communities.

Netherlands, where 65 citizens out of 100 use the internet for the same purpose (European Commission, 2017: 13-17). When looking at more granular data, the number of adults that have visited a heritage website in England has slightly increased to 26.5% in 2017/18 mainly to check opening times, to find out more about an exhibition or an event, or to book a ticket (Department for Digital, Culture, Media and Sport, 2018).

The most recent analysis of the characteristics of visitors to Italian museums, exhibitions and archaeological areas confirm that most of the population is unfortunately excluded from this activity, for reasons that can be traced to barriers and obstacles that prevent access (53% of sites have removed barriers and only 12% offers multisensory and information for visually impaired), in a physical, economic, but also, and above all, in a cultural sense, and these factors discourage participation in cultural activities[39] (ISTAT, 2006; Solima, 2012: 16; ISTAT, 2019).

The picture that emerges in Italy is a progressive loss of the connection between citizens' identity and cultural goods that have been the glue between those who live in a territory and the visible and tangible signs of its history. This loss in value of cultural goods, expressed by cultural, historical, economical and as collective/personal identity, is transformed into a perception of heritage as an obstacle rather than as a resource. It is seen as a form of collective unconsciousness that produces, at best, disinterest or neglect, or misconduct at worst (Toscano, 2000). This connection seems contrast with the richness of heritage areas that counts over 4,900 between museums, archaeological sites and monuments that have attracted over 128 million in 2018 (ISTAT, 2019). However, only 10% of them has a digital archive and presence and only half of the sites present guides and panels in languages other than italian despite 46% of visitors is not Italian (ISTAT, 2019).

The research conducted by ISTAT (2018) is also aiming to communicate to citizens the value and the significance of cultural heritage, not in opposition to the theme of protection and of conservation but considered as different faces of the same coin. Engagement in the digital world is also complementing face-to-face engagement instead of substituting it (Requena and Ayuso, 2018), and it is enriching learners' experiences transforming them into digital citizen scholars. The communication of heritage content via different media (including social networks) and education are, potentially, two of the most effective tools to overcome this progressive detachment between citizens and their cultural goods.

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[39] Most visitors are middle-to-high-level socio-cultural people, and analysis of the age bands also shows how whole segments of the population, particularly young and old, are present in only very low percentages.

1.6.4 The context: Portus and its history

While the beginning of this section has illustrated the development of online courses first, and how cultural heritage is seen in the European context, this paragraph will provide some background on the history and archaeology of the site that inspired the creation of the heritage MOOC and object of this thesis.

This research starts with the assumption that it is essential to understand the history of a place and cultural implications connected to it before analysing the outcomes of the study. Portus represents a unique case because despite the importance this site held in the past, historical events have protected but also isolated it from the surrounding Italian community for a long time.
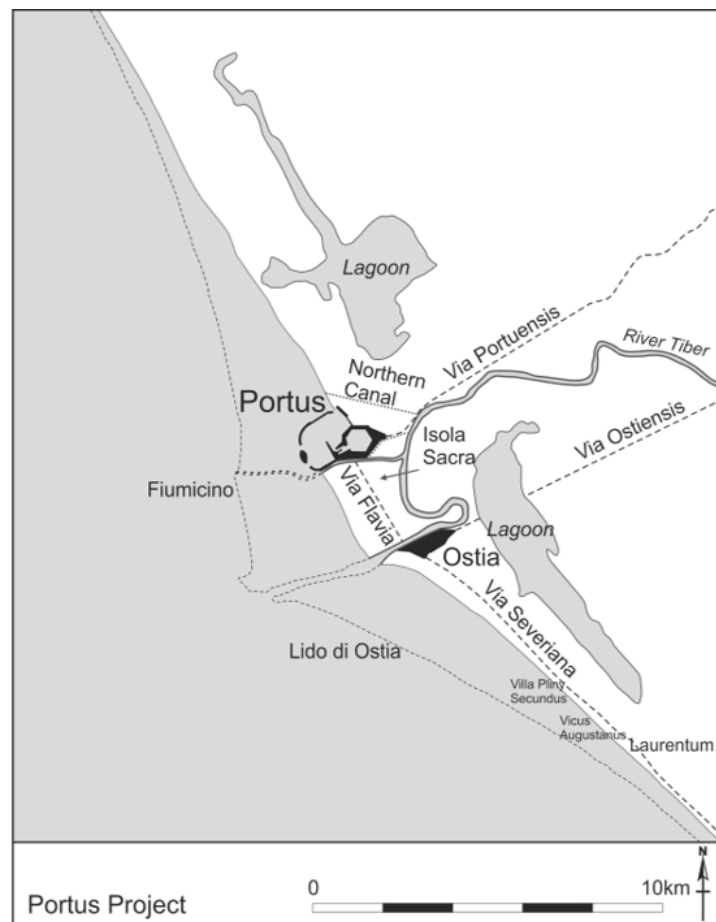
Figure 4 Map of the site on its major extensions with reference to the modern coastline. (Image from the Portus project archive)

The site of Portus (**Error! Reference source not found.**) was the maritime harbour of imperial Rome, covering an area of 69 hectares on land which is only partially excavated. It was linked to the fluvial harbour of Ostia, located 3km to the south, and it formed a system

that controlled all incoming and outgoing goods to Rome. The site started with a 200-hectare harbour basin, established by Emperor Claudius in 46 AD and inaugurated by Emperor Nero in 64 AD. This so-called "Claudian" basin was connected to the Tiber by two large canals that were used to move cargo and ships to Rome, and to prevent flooding. It was then expanded with the creation of an artificial hexagonal basin during the reign of Emperor Trajan, with work concentrating mainly between 110 and 117 AD.

Following this expansion, the second half of the 2nd century AD sees the construction of new buildings (such as the Grandi Magazzini di Settimio Severo) and the reconstruction of those from previous phases. Three additional periods of occupation have been established by current researchers: 1) early 3rd century, 2) between the late 4th and early 5th century, and 3) between the late 5th and 6th centuries (Keay et al. 2005, Keay and Paroli, 2011, Keay 2012, 2013). The different phases of occupation of the site and the major buildings and areas researched within the Portus project have then been used as the main narrative of the Portus MOOC. A different period was introduced each week in chronological order (Claudian phase[40], Trajanic phase[41], later 2nd century AD[42], early 3rd century AD[43], late 5th to 6th centuries[44]) with the support of information about important buildings (great basin of Claudius[45],grandi magazzini traianei[46] and terme della lanterna[47], grandi magazzini di Settimio Severo[48], building five[49], basilica portuense[50], the imperial palace[51], the amphitheatre[52] and the castellum aquae[53]) and finds associated with the period (amphora sherds[54], brick stamps[55], Portus head[56], bronze costantinian coin[57], byzantine cross[58]). This structure allowed the MOOC to introduce different techniques used during the project (such

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[40] https://www.futurelearn.com/courses/portus/6/steps/310442
[41] https://www.futurelearn.com/courses/portus/6/steps/310462
[42] https://www.futurelearn.com/courses/portus/6/steps/310484
[43] https://www.futurelearn.com/courses/portus/6/steps/310503
[44] https://www.futurelearn.com/courses/portus/6/steps/310521
[45] https://www.futurelearn.com/courses/portus/6/steps/310454
[46] https://www.futurelearn.com/courses/portus/6/steps/310471
[47] https://www.futurelearn.com/courses/portus/6/steps/310472
[48] https://www.futurelearn.com/courses/portus/6/steps/310489
[49] https://www.futurelearn.com/courses/portus/6/steps/310512
[50] https://www.futurelearn.com/courses/portus/6/steps/310524
[51] https://www.futurelearn.com/courses/portus/6/steps/310544
[52] https://www.futurelearn.com/courses/portus/6/steps/310547
[53] https://www.futurelearn.com/courses/portus/6/steps/310548
[54] https://www.futurelearn.com/courses/portus/6/steps/310458
[55] https://www.futurelearn.com/courses/portus/6/todo/27560
[56] https://www.futurelearn.com/courses/portus/6/steps/310498
[57] https://www.futurelearn.com/courses/portus/6/steps/310516
[58] https://www.futurelearn.com/courses/portus/6/steps/310538

as geophysics[59] and coring[60], excavation and documentation[61], virtual reconstruction and representation[62], laser scanning[63]) to analyse, explore and interpret data from specific finds, buildings or areas of the excavation.

In 314 AD, the city of Portus was made autonomous from Ostia and was granted the title *Civitas Flavia Costantiniana Portuensis[64]*, commonly referred as *Portus Romae,* by decree of Emperor Constantine. In this period, Rome was beginning to be affected by a series of problems, including lack of food and supplies.

By obtaining the title of *Civitas*, Portus could have autonomously increased protection and tightened access to essential areas of the region (e.g. warehouses to protect supplies). Bevelacqua (2016) suggested that this is what likely led to the construction of the first defensive wall. The worsening situation in Rome, combined with a consequent decline in population and the intensification of raids, required an increase in protection for transported goods, and their placement in easily defendable storages. In a later phase, the old building structures were used, altering the layout and the original functions to increase defence even more (e.g. the *Magazzini Traianei*'s western side retains traces of repetitive defensive operations). The residual activities concentrated in this area continued until the Middle Ages, while the buildings outside the walls were gradually abandoned (Varagnoli, 2013).

Changes in the morphology of the territory, the advancement of the coast and the lack of maintenance resulting from the economic and political collapse of Rome caused the disuse of most of the site, and at this point, the basin had been neglected and almost entirely filled by sedimentation. The basin was then partially used by the diocese as a fishing spot during the medieval period (Varagnoli, 2013). Throughout this period, the area was also repeatedly flooded, which led to a rise of malaria from the surrounding marshes (Cathopedia, 2017).

Despite its abandonment as a commercial centre, Portus and Ostia were chosen to be amongst the seven suburban dioceses, which are still in existence, reserved for the members of the highest order of Catholic Cardinals, the Cardinal Bishops. The prelates of these otherwise insignificant Roman suburbs outrank all archbishops, even the patriarchs (Cathopedia, 2017). Popes Pio II and Sisto IV tried unsuccessfully to rejuvenate the area, until it was sold to Panfilo di Pietro, a local landowner, in 1796 in an attempt to restore the degraded area to its ancient splendour. Unfortunately, the site was subsequently plundered

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[59] https://www.futurelearn.com/courses/portus/6/steps/310488
[60] https://www.futurelearn.com/courses/portus/6/steps/310493
[61] https://www.futurelearn.com/courses/portus/6/steps/310504
[62] https://www.futurelearn.com/courses/portus/6/steps/310514
[63] https://www.futurelearn.com/courses/portus/6/steps/310510
[64] *Civitas* is the Latin term that indicated a group of citizens lived united by law as a group, in a city.

in 1822-1823 (Lugli and Filibeck, 1935: 204). Excavations were carried out by Cardinal Pacca, Bishop of Portus, near Capo due Rami (1822), by Guidi (1836 and 1852-1858), and by Giuseppe Melchiorri (1839) (Impiglia, 2016).

It was only when Prince Alessandro of Torlonia purchased the estate in 1856 (Lugli and Filibeck, 1935: 204) that a substantial restoration of archaeological remains and the development of a plan to defeat malaria was enacted. This started with the construction of the Villa Torlonia to the north east of the harbour, and with new excavations in 1863 and 1869, which focussed on the recovery of works of art and antiquities.

The statues, reliefs and materials discovered by the Torlonia family were taken to the *Museo Torlonia*[65] in Rome, which was founded in 1859 by Alessandro. 620 pieces of sculpture were on display in 77 rooms, and they represent the most important private collection of ancient sculpture in the world. Many of these objects were either bought from other Roman families, or found during fieldwork on various family properties in *Latium*[66], such as the *Villa dei Quintilii* and Portus. During this period, the family only allowed visits by the aristocracy, but in 2005 the collection was sold to the city of Rome.

At Alessandro's death in 1886, his daughter Anna Maria Torlonia tried to complete the work he had begun by constructing thirty bridges connecting the various canals and drains. Unfortunately, her work, in conjunction with the one executed by the *Genio Civile*[67], did not decrease the spread of malaria (Impiglia, 2016: 219).

After the creation of the Italian Kingdom in 1861, Garibaldi felt more could have been done for the city of Rome, and decided to restore its greatness by reclaiming the *Agro Romano*[68], transforming the Tiber into a navigable river from the capital to the sea. Davide Bocci, an engineer of the *Genio Civile,* worked on a project to re-launch the Tiber's navigability along with the reactivation of the Trajanic basin as an internal port linked to the main river by a new channel (Bocci, 1935: 12; Lugli and Filibeck, 1935: 205).

Portus' stagnant state, which continued until the 1920's, had for centuries created the ideal conditions for mosquitoes carrying malaria, and this was a contributing factor to the site's disuse. However, important evidence to reconstructing the different phases of the land

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[65] Torlonia Museum
[66] Lazio, current region of Italy.
[67] At present, Genio Civile is a regional peripheral organ on a provincial basis, which assures, under its control, all functions relating to the execution of public works in Italy. In some regions it has been closed and its functions have been absorbed by other entities such as Sardinia and Lombardy.
[68] The *Ager Romanus* is the geographical rural area that surrounds the city of Rome. It also represented the area of political influence of Rome's municipal government.

reclamation of Porto is represented by the publication of zoologist Giovanni Battista Grassi, who studied malaria development (Grassi 1898; 1899; Grassi et al. 1899) in the area. He developed a dual strategy based on health prophylaxis[69] and on practical remediation actions to be executed on the landscape (1901). This help to defeat malaria in the area.

Finally, Prince Giovanni Torlonia, Alessandro's son, succeeded in recovering outstanding archaeological records, which had been left in a state of degradation and abandonment. In 1923, the Italian Kingdom intervened, and this is described in the *Legge Speciale per la Bonifica Integrale*[70](1923). It was intended to complete the unfinished work carried out at the end of the 19th century.

Work on the Trajanic Basin officially started in 1924, and led to the creation of a large park in which nature and heritage found a new balance. This increased the value of the archaeological site. Inspired by Trajan, Giovanni decided to divide the work in the archaeological excavations, to both retrieve ancient glory with the support of academics, and to develop an efficient infrastructure (Impiglia, 2016: 220). To commemorate this project, Omero Taddeini produced a bronze medal (Figure 5) with the image of the great hexagonal port of Trajan, restored to its original hexagonal configuration. Impigia (2016: 235) suggests that the medal was primarily an element of propaganda, similar to that of the *Duce*[71] (Figure 6). Prince Giovanni played an important role as a proponent for progress of the *Agro Portuense*[72]*,* and brought a new shine to the glory of his house.

Contemporarily, the work of Giuseppe Lugli, Professor of ancient Roman topography at the University of Rome, led to a landmark study (Lugli-Filibeck 1935), with a new plan and model created by Italo Gismondi. The model of Portus, currently in the *Museo della Civiltà Romana*[73], had been used as an accurate reconstruction of the site by many later scholars until more recent representations were produced by the Portus project.

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[69] Preventive healthcare consists of measures taken for disease prevention.

[70] The Special Law for the Complete Reclamation (1923) programmed a series of interventions, which included the creation of canals, roads, bridges and riverbanks, from the other new hydropower stations along the Roman coast and the restoration of the pre-existing Maccarese Mountains.

[71] *Duce* is an Italian title derived from the Latin *dux.* Benito Mussolini was identified by the National Fascist Party as '*il Duce'* which means 'The Leader'. He holds the position of *Sua Eccellenza Benito Mussolini, Capo del Governo, Duce del Fascismo e Fondatore dell'Impero,* ('His Excellency Benito Mussolini, Head of Government, Leader of Fascism and Founder of the Empire') from 1925 until 1943.

[72] Rural area around the site of Portus subjected to political and historical influence.

[73] Museum of Roman Civilisation.

Figure 5 The bronze medal created by Omero Taddeini in 1923 (Torlonia Archive, b 79, Iasc. 46). On the left is the Trajanic basin with the buildings built by the Torlonia family (Villa di Porto and Procoio rustico). Around the hexagonal basin there is an inscription, "TRAIANI • LACUM • IN • PRISTINUM • ET• PORTUENSEM • AGRUM • IN • APRICUM • REDEGIT" ("..*restored the ancient lake of Trajan and the field around the port to a pure state*"), and on the right is the portrait of Prince Giovanni Torlonia with the inscription, "JOANNES • TORLONIA • ROMANUS • V • P • A • D • MCMXXIII" on the reverse ("*Giovanni Torlonia, Romano, 5 April 1923*") (image from Impiglia, 2016: 235).

Following this intensive reclamation and restoration of the communication routes, the redemption of the territory into civil and productive life saw the agricultural activity of *Agro Portuense* quickly recover a position of primary importance in the local economy, but the beginning of the Second World War interrupted this period.

Until June 6, 1944, the marine infantry unit of the Italian Navy (known also as X MAS) was set up in Trajan's harbour and equipped with assault rifles, with the aim of facing the allies landing on Anzio and Neptune's front. Their equipment was hidden in the connecting channels between the hexagonal lake and the Tiber River. The soldiers instead stayed in the property owned by Torlonia, which lies in the pine forest surrounding the lake (Nesi, 2004: 150).

Figure 6 Mussolini visiting the Torlonia's property close to Fiumicino, the current Portus Oasi in April, 1930 (image reproduced with permission of the rights holder, Istituto Luce-Cinecitta' srl, A27-225). Fascist ideology was frequently modelled on ancient emperors like Trajan, because they set a historical precedent for colonial and political ambition. Frequently, restoration of antiquities was part of the accompanying propaganda, and this tactic inspired 20th century leaders. For example, videos of Mussolini's visit to the site have been used in subsequent propaganda videos[74].

For decades following the Second World War, the entire territory was in disarray, but eventually a need to provide infrastructure to renovate war torn areas led to the planning of an airport by the newly created Italian Republic[75]. For this, the Fiumicino area was selected, as marine and fluvial infrastructure had already been in place since 1901. During these developments, one of the major problems was adapting the complex infrastructure of an intercontinental airport (Figure 7) to a site that had been mainly used for an agricultural function until that point. It has since been suggested that the decision to use this specific

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[74] https://www.youtube.com/watch?v=HphPd7Z4d-s
[75] On 2 June, 1946 the Italian referendum vote decreed the birth of the Italian Republic. The new political phase was officially sanctioned with the election of April 18, 1948, with the victory of Democrazia Cristiana (Christian Democratic Party), which conquered an absolute majority of seats.

location was linked to the need to decrease the political and economic power of the old aristocratic families (Impiglia, 2016: 337-350).
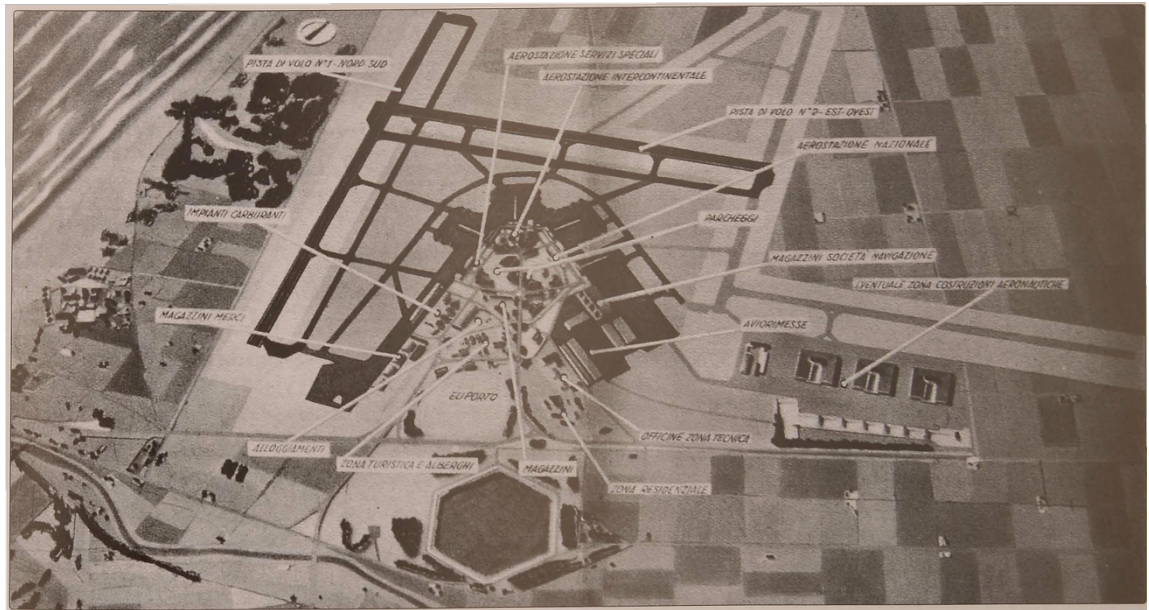
Figure 7 The plan of Fiumicino Airport with indications of the function of each area. (Photo, Ministry of Aeronautic Defence, 1956)

Figure 8 An image of one of the boats discovered during the works at the Fiumicino Airport in 1959. (photo, Collettini et al., 2016)

During the construction of the airport, between 1958 and 1965, the remains of five Roman ships along with the fragments of two others were found, dated to between the II and III century AD, were found in an area near to the northern mole of Porto di Claudio.

These boats (Figure 8) were later exhibited in the *Museo delle Navi*[76], which was built in the 1970s and 1980s directly at the discovery site.

From the seventies, the Sforza family invested in the archaeological park of Porto, hiring two great landscape architects, Page and Pejrone, whose challenge was to rejuvenate the site of the Villa di Porto, designing avenues, gardens, woods and lakes to balance and beautify the new with the archaeology.

In 1973, Duke Ascanio Sforza Cesarini[77] decided to re-purpose a vast area of the Portus Archaeological Park into a "Zoo-Safari" (Figure 9), in an attempt to maintain possession of the land following a wave of intense political pressure that was about to make the land public.

Figure 9 A photo of Portus as a Zoo Safari in the late 1970s. (Photo by Antonia Arnoldus-Huyzendveld[78])

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[76] The Museum of Ships has been closed to the public since 2002 for restoration. It is planned to reopen in 2019.
[77] Nephew of Prince Giovanni Torlonia.
[78] Accessible at ostia-antica.org

However, the western part of the original park was renamed *Parco Archeologico Naturalistico del porto di Traiano*[79] (PAN), and the area between the hexagonal basin and via della Scafa was expropriated in 1988.

While the area was becoming an important part of the local development plan of Fiumicino (Law n.2008/3 of 19/02/1992), Duke Ascanio proposed a series of interventions to protect local biodiversity, and the *Oasi di Porto* was opened in 1993. The *Oasi*, destined to become an example of an archaeological-naturalistic park and regularly open to the public, was enlarged by the inclusion of the Trajanic hexagonal in 1994 and listed as a "Special Protection Area" by the European Union (79/409/CEE) a year later. However, the local community only had a couple of years to visit and enjoy the park as, in 1996, a ruling by the *Consiglio di Stato*[80] annulled the expropriation and restored the property of the shores of the lake and the area with the villa and the garden to the Sforza-Cesarini family (Rossi, 2015: 81).

In recent years, an extensive survey was carried out in a small area still owned by the State, by the Universities of Southampton and Cambridge (Keay et al., 2005). This was followed by five years of programmed excavation (between 2007 – 2012), funded by the Arts and Humanities Research Council (AHRC) and the Soprintendenza Speciale per il Colosseo, il MNR e l'Area Archeologica di Roma. It has produced a number of publications and advanced the knowledge of the site (Keay et al., 2005; Keay and Paroli, 2011; Keay, 2012; Keay, 2013). The Portus project was followed by the Portus Limen project; an additional five years of EU funded research looked at the relationship between Portus and the other Mediterranean harbours.

In 2013/14, a Massive Online Open Course (MOOC) was created by the University of Southampton to disseminate results and engage with a broader public. The first run of the course included daily interaction with students working on site as part of their undergraduate training and the possibility to visit the site by appointment.

In the media, the archaeological site has returned to the political agenda with a written parliamentary question from Emiliano Minnucci (2014: 4/07060) who summarised the history and importance of the site and stated an increase in site visits, from 3,500 to 7,000 per year in 2013-2014, and noted that it is still far from the 300,000 visits per year of Ostia due to the events organised there on site by Fiumicino City council. Minnucci mentioned

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[79] Archaeological and Naturalistic Park of Traiano.
[80] The Council of State is a legal-administrative consultative body and ensures the legality of public administration (Italian Constitution, Article 100).

that whilst the hexagonal basin is visited by schools and tourists, it is undermined by both a lack of public transport to and from the site and a lack of facilities to welcome visitors and create an economic impact in the region.

Despite the size and the relevance of the site, it is divided between public and private property, is in the middle of the local airport ecosystem, and although it is closely linked to the community, they have only ever experienced the site (hexagon, park and archaeology) as accessible for three years in its entire history. Because of this fractured legacy, the local community formed the *Comitato Promotore Sistema Archeologico integrato di Fiumicino Ostia Antica*[81] to develop, protect and open Portus and Ostia as one archaeological park to attract tourism and create new job opportunities. Since its inception in 2014, the Committee has been active in lobbying the Ministry of Cultural Heritage, organising petitions and collaborating with local authorities (Terzobinario, 2016). Their initial petition (2014) has collected over 10,000 signatures and led to the creation of a preliminary report on an integrated archaeological system between Ostia and Fiumicino, while their second petition (February 2015) has seen the shipment of 5,000 postcards to the Minister of Cultural Heritage asking for an increase of opening times of the Portus site that was accessible only by appointment until then. Since then, the opportunities to visit the site have increased and a new archaeological park to include Ostia, Portus, Isola Sacra excavations and the *Museo delle navi* has been created in 2016. Despite the park including different archaeological areas (Ostia, Portus and Isola Sacra), Ostia is the only one open and accessible every day and there is no direct public transport linking the different areas.

In addition to the activities organised on site by the Committee and the Soprintendenza, *Navigare il Territorio*[82] aims to engage with the local community, starting with schools, to promote archaeology and cultural heritage. To help to achieve this, activities targeting different age groups are offered to schools during the winter and to families during the summer period.

1.6.5   Visualisation in archaeology and heritage

The importance of visual studies within archaeology as a medium to communicate historical content is well established. It has focused from the history of pictorial

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[81] Committee for the promotion of an integrated archaeological system between Fiumicino and Ancient Ostia.
[82] It is a project started in 2015 from a collaboration between the Benetton Foundation, Rome Airport, Ostia Archaeological Park, Ministry for Cultural Heritage and Tourism and Fiumicino City Council, and the *Progetto Tirreno – Echo Schools*.

reconstructions of ancient life (Moser, 2008) to audiovisual and film making (Rogers, 2019; Piccini, 2014: 3-4; Bonacchi, 2014:118; Bonacchi et al., 2012: 52) and three-dimensional visualisation (Reilly, 1991; Fischer, 2010), challenging familiar assumptions about our understanding of humans in the deep past. Attention has also turned to other themes concerning imagery in archaeology (Molyneaux, 1997:1-10; Smiles and Moser, 2005: 6; Moser, 2012: 302, Perry et al., 2014), discussing the long-lasting effect of the relationship between visual representations and our perceptions and expectations of the past (Moser 2001: 263-4; Moser and Smiles 2005: 6; 2009: 3) and their use as research or public engagement tool. The way in which the past is represented and communicated makes the difference (Stone and Molyneauz, 1994:15). At the same time, the narrative style is key to engaging the audience in the visual experience to the extent that the observer becomes part of the observed (Kennedy, 2002). On the same idea is Forte (1993), who suggests that a virtual narrative reconstruction allows a more explicit explanation and engagement with the public.

Moser's research of the relationship between museum displays, scientific illustrations, artistic paintings and archaeology have shown how archaeological visualisations have played a fundamental role in embodying theories and perspectives, in constructing knowledge as a part of the scientific process, in sustaining past ideas, and in defining disciplinary boundaries (Moser 2012; 2014; Moser and Gamble 1997; Moser and Smiles 2005). In this context, the Visualisation in Archaeology (VIA) project[83] explored visual representation practices and standards, starting with the assumption that scientific publications and wider communication might require a different approach (Gibbons, 2010). The results of this three-year project identified a general shift from a more traditional textual communication to mixed methods (images, texts and sounds) that requires a different type of engagement from the end-user (Gibbons, 2012; Gibbons et al., 2014).

However, archaeology seems to maintain a more traditional approach to communication where the majority of specialist illustrations (75%) are intended for publication, and less than 10% are disseminated via different media. What emerges is a scenario where visually accurate outcomes are easily available only to a restricted and specialist audience formed primarily by professional archaeologists (Gibbs and Colley, 2012). More broadly, while archaeologists have been called to re-consider images as an independent and powerful medium more than a complement to a text (Perry 2011: 315; Perry 2015: 203; Smiles and Moser 2005: 2), beyond archaeology, Hargreaves and Ferguson have

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[83] The original website (www.viarch.org.uk) built for the project is not accessible anymore, but reports are available via the Archaeology Data Service website (https://doi.org/10.5284/1023599)

lamented the shortage of case studies within science communication and recommend that a critical examination of the merits of multimedia representations of science is necessary (2001: 63).

The London Charter[84], launched in 2006, set out a way to ensure that scholars creating images of the past could demonstrate data as a foundation for their computer-based visualisation of cultural heritage (Beacham et al., 2006; 2016: 11; Hermon et al., 2007: 15) and plays a central role in provoking an open conversation while advancing scholarship (Haynes, 2017). While the Charter is created as a tool to support communities of practices, creating a benchmark for heritage visualisation, promoting intellectual transparency, enabling visualisation, enhancing heritage interpretation, it also recognises that a visualisation without all these components is a missed opportunity that could harm the visualisation (Denard, 2011). Frischer (2008) indicated how 3D modelling is also used to discover and recover data from archaeological remains, rather than simply illustrate the appearance of archaeological sites. It represents the way to change the irreversible destructive form of the excavations, virtually preserving the site. According to Colin Ware (in Frischer, 2008: V-Vi), a visualisation can facilitate the cognition of a large amount of data, can promote the perception of emergent properties, can help in formulating a hypothesis and can make clear the relationship between large and small scale features. On the same idea is Hermon (2008: 37), who stated that "*The better the visual tool is, the better the explanation and the comprehension are*", in relation to the use of three-dimensional modelling in archaeology introducing the concept of quality of the visual tool used as a means to improve the message convened.

While the London Charter points out the generic need for transparency in the relevant fields of cultural heritage, the Seville Principles take up these reflections and examine their implementation in the field of virtual archaeology. They propose a definition of the virtual reconstruction as "*using a virtual model to visually recover a building or object made by humans at a given moment in the past from available physical evidence of these buildings or objects, scientifically-reasonable comparative inferences and in general all studies carried out by archaeologists and other experts in relation to archaeological and historical science* " (Grande and Lopez-Menchero, 2011).

In addition to the use of reconstruction to communicate a message to an audience, Earl (2013) focuses his attention on the creation of 3D models as an active dynamic tool for interpretation and debate. This uncovers an additional dimension to the use of technology,

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[84] https://www.londoncharter.org/index.html

transforming it into a pedagogical tool where the development of an understanding of the data is directly connected with the development of researchers' digital skills. Similarly, Nicholls (2016; 2017a) described how the process of researching and combining all the sources into a single 3D model of the city of Rome in Sketchup has deepened and widened his previous knowledge of the place while providing a new perspective. He found the entire learning process as much invaluable as *fun*, and decided to develop a third-year undergraduate course on it. The module, which is still part of the University of Reading's offer, requires students to create their own model of a local roman town, starting from historical or archaeological evidence. It encourages creativity, active learning, and critical interrogation of this frequently encountered mode of visual interpretation to maintain accuracy in the reconstructions in line with the London Charter's principles (Nicholls, 2019: 142). The inclusion of the development of 3D digital content into a curriculum allows students to develop valuable transferable digital skills via enquiry based learning but also encourages new approaches to the traditional questions of evidence and presentation, deepening critical engagement with the way the past is studied and presented (Nicholls, 2019). The 3D model was then reused, in conjunction with rendering software and app viewers, to integrate the *Rome: A virtual tour of the Ancient city*[85] MOOC creating a series of videos with fly through the reconstruction, 360 panoramas, and allowing learners to walk around and tour the space independently, adjusting the lighting or changing the view point (Nicholls, 2017b). Despite using freely available software and compatible plugins to automate or speed up some tasks, the size of the files produced has been recognised as a limit to the engagement with the model that has been divided into sections and simplified before being uploaded to Sketchfab[86] or SketchUp 3D Warehouse[87] (Nicholls, 2016). The use of external well-known platforms for the content support long term reusability and sustainability as models can be downloaded, used, reused and re-published according to the copyright licences provided. It also needs to be noted that some of the more advanced functionalities available are restricted when using SketchUp on a free licence.

Moreover, Haynes (2017) presented three examples from the Frontiers of the Roman Empire Digital Humanities Initiative (FREDHI) on how data visualisation can contribute to interpreting and understanding complex data, at the Open Cultural Heritage Scholarship

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[85] https://www.futurelearn.com/courses/rome
[86] Sketchfab (https://sketchfab.com/) is a platform to publish, share, discover, buy and sell 3D, VR and AR content.
[87] 3D Warehouse (https://3dwarehouse.sketchup.com/) is a website of searchable, pre-made 3D models that works seamlessly with SketchUp.

Workshop[88]. The visualisations were included into the *Hadrian's Wall: Life on the Roman Frontier* MOOC to provide a wider audience with different ways to engage, advance and encounter the resource. A GPS linked app[89] allowing users to see how the modern city would have looked in roman times was the first development of the project, was followed by a desktop app on a game engine platform[90]. This second visualisation introduced users to the concept of uncertainty, offering multiple reconstructions and promoting an academic debate on how the landscape would have looked. The last visualisation was developed as an image to be located at the Newcastle Train station showing how the same view of the station would have looked like in the past. In this respect, such heritage visualisations within the MOOC were used to promote the tools and the research outcomes while collecting feedback on the different reconstructions.

More recently, exploration on how results from archaeological fieldwork should be organised around a coherent narrative and accessible to non-archaeologist (Lucas, 2012: 254) has led to the use of digital technologies for experimenting with new forms of publications (Evans and Daly, 2006) including on an open-access platform linking the excavation data with their interpretation (Ashley et al., 2011: 3). As a result, Lund University Digital Archaeology Laboratory DARKLab[91] has recently developed a digital reporting system designed to provide archaeologists with a dynamic and interactive 3D web platform that can be used for describing in great detail records, and that is able to communicate the interpretation of the gathered data (Dell'Unto, 2018; Derudas et al., 2016).This solution aims to fill the gap between the existing platforms focusing on digital publications (Sullivan, 2017), targeting both scholars and the general public (Opitz et al., 2016), and the web-based platforms used to manage and visualise excavation data from the analytical point of view (Jensen, 2018). Similarly to the MOOCs, the platform developed at Lund allows users to explore different narratives based on the material and archaeological contexts, and it has been used as an educational tool allowing students in archaeology to review the primary dataset in connection to an interpretation.

The successful inclusion of 3D technologies (such as virtual reality, augmented reality, 3D modelling and printing, and scanning) into higher education as a way to develop learners

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[88] The workshop was funded by the Worldwide Universities Network and by the British Council RENEKI network and hosted by Ritsumeikan University (Japan) 24-28 June 2017. https://wun.ac.uk/wun/research/view/open-wun
[89] https://itunes.apple.com/us/app/explore-hadrians-wall/id1016336484?mt=8
[90] https://mooc-images.ncl.ac.uk/hadrian/explore260615/Explore%20Hadrian's%20Wall%20-%20Web.html – this application is not accessible anymore
[91] https://www.darklab.lu.se/

digital skills and achieve particular learning goals has been extensively discussed by Pomerantz's report from the EDUCASE project (2018a). Despite recognising some financial, staff skills and infrastructure limitations that would reduce the applicability of technologies to all courses (Pomerantz, 2018a: 39-41), the publication draws parallels between the general perception of online and offline worlds often seen as entirely separate while they are in reality integrated (Tufekci, 2017) with the use of technology into everyday life, including education. The *Digital Education with Cultural Heritage* MOOC developed by European seems to address the concerns raised around the need for skilled educators able to understand the potential of the tools and adapt them to the pedagogical approaches adopted while promoting innovations in online teaching.

1.6.6   Portus in the Media

It is without a doubt that Portus was an important site that has been part of a wider plan to demonstrate the power and influence of Rome across time. As a result, the site has been represented visually across the centuries in various ways, and this section will look at how Portus has been portrayed by the media, and how it has been made accessible to children in the last couple of years using school texts, TV documentaries, newspapers and books as case studies. As part of this study, it is crucial to assess how much previous knowledge of the site each student has and if they have been exposed to any related content inside or outside the classroom that might have impacted their understanding of the site.

Portus has been represented in many different ways, from coins to models and maps in the same way other heritage site have experienced. The Portus project started, instead, to provide the general public with direct and mediated access to the research outcomes and visualisations via the Portus MOOC and the BBC documentary. This wider attempt to make accessible visual renders of the different areas of the excavations runs alongside the efforts from the local community to raise the profile of the site to attract tourists and share cultural heritage.

As a first step, Italian secondary school texts have been reviewed. School books are one of the first standardised sources of knowledge for students. Books are chosen by the teachers based on the offer promoted annually from the thirteen specialised publishers that operate in Italy[92] (Incelli, 2019). As part of this project I have been examining texts used by the schools participating in the pilots, and the editions used in my local school as an additional sample; none of them mention the site of Portus. Ostia is instead usually

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[92] https://writingtipsoasis.com/it/case-editrici-di-libri-scolastici/

mentioned as the Harbour of Imperial Rome. In addition to school texts, TV and printed newspaper information represents a means of reaching a wider audience (Holtorf, 2006). It has been argued that a single episode on prime-time television reaches more people than all science and technology promotional effort together (Gerbner, 1987:115). This is probably still the case for archaeology, where films and tv series are quite popular in both Italian and British Television.

Focusing on television programmes first, a documentary titled "Rome's Lost Empire" has been broadcast by BBC One several times since November 2012 (Figure 10). The programme was not focused on the site of Portus itself, but showed the excavation, and some of the technologies used by archaeologists to interpret the archaeological record. Portus was presented as a site connected to Ostia but not as part of it. Through the programme, it appears clear how all reconstructions of Portus were created based on the archaeological data from the excavation and in direct collaboration with the researchers working on the site.

Figure 10 Dan Snow and Simon Keay with a visualisation of building 5 showing the excavation at Portus produced by the BBC for "Rome's Lost Empire" documentary (image from the Portus project).

Unfortunately, audience data is not available, which makes it challenging to identify any demographic related to age, but the BBC documentaries have a more traditional magazine-style format, similar to those shown on Italian TV. Rai 3 has been offering archaeological based documentaries for many years. In particular, the programme

presented by Alberto Angela called "*Ulisse, il piacere della scoperta"* has been broadcasted for 18 years. With almost two hundred episodes it is watched by an audience that varies between 1.5 and 4.9 million, to viewers ranging from between 4 and 90 years of age.

In 2009, Angela dedicated one episode specifically to Portus (Angela, 2009), where he defined it as the "greatest harbour of antiquity" as formed of two parts, Ostia in the south, where administration was based and where the romans were living, and the hexagonal basin in the north, where all the boats arrived. In 2012, he created a second episode on Ostia where he discussed the importance of the Trajanic Harbour and showed a reconstruction of the *Darsena* and *Magazzini (*Figure 11)*.* The material produced has then be edited again for a subsequent episode aired in 2015 (Angela, 2015). Angela's shows are well established in Italy and are known for their educational rigor, and due to this he holds an important authoritative role. In this case, the visual reconstructions were provided by an external Italian company specialising in the representation of heritage sites for documentaries and multimedia. It is unclear, however, how the representations have been produced.

Figure 11 Alberto Angela with a visualisation of the *Magazzini* at Portus. The image was produced by the company altair4.com (Altair4 Multimedia, 2012) for Angela's documentary in 2012 and the reused for a more recent episode (Angela, 2015).

Earl (2005) has discussed the need for illustrators and computer graphics to maintain the academic bias in practice while satisfying the needs of the documentary and film makers. Given the opportunity to generate visuals identified as so significant in the generation of

71

internalised views of the past, archaeologists must consider and work within the framework of the media. In this respect, the work conducted by the Portus project has been an exemplar of how 3D modelling and visualisation have helped during the interpretation process and how this has been reflected in all visual outcomes (Harrison et al., 2013).

Looking at newspapers, surveys are showing that most non-archaeologists aware of new discoveries have learned it from newspapers. This indicates that the role of online and paper news editions are still significant. (Holtorf, 2006: 46). Data from Web of Science[93] shows that over 56 academic articles have been published about the site since 2009 across 9 different subjects demonstrating the interdisciplinary nature of archaeology (Figure 12). Articles are in six different languages with English being the most popular language of publication, followed by French and Italian (2 articles each) and German, Spanish and Portuguese (1 article each). From the initial results, only the one related to "Portus" located in Fiumicino have been considered. A small difference appears between the UK and Italian publications and press with the former mentioning the site of "Portus" frequently, and the latter using "Portus" and "Trajan and Claudian Harbours" as interchangeable terms. In the most recent article published, the site has been referred as the "Imperial Harbours of Trajan and Claudio" only by the new director of the Park of Ancient Ostia (Costantini, 2017).
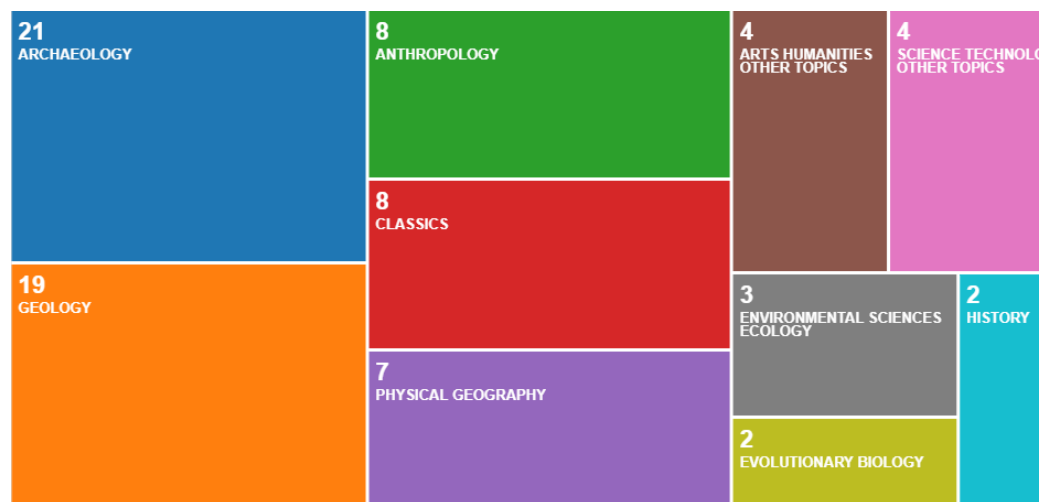
Figure 12 Threemap representing the topics of the publications mentioning Portus.

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[93] Web of Science search as follow: TOPIC: (Portus) Databases= WOS, BCI, BIOSIS, CCC, DRCI, DIIDW, INSPEC, KJD, MEDLINE, RSCI, SCIELO, ZOOREC Timespan=2009-2020 Search language=Auto

The final stage of research involved a review of books available in public libraries. They represent in fact a more traditional approach to school research at any level and are open to everyone free of charge, and are yet one of the most powerful tools archaeologists have to engage with children and parents.

A local public library in Guastalla[94] was taken as sample for Italy. This library was chosen as local schools take pupils from 3 to 10-year-olds regularly to the library as part of their education. The engagement with schools occurring in this small northern town is similar to the one happening across Italy with the support of the MiBACT[95] initiative "Educate to Reading"[96]. The topic is of central importance in a country where most Italians do not read for pleasure or have an occasional relationship with books and where there is a discrepancy between north and south. In 2019, the call for funding was open to projects where books were used as a tool for personal development and growth. The library and school can therefore establish a constant dialogue and collaboration, promoting reading together with a non-formal approach, supported by curiosity and pleasure.

The library has a section with around 50 books on Romans available to 8 to 15-year-olds. Only three books presented texts or images related to Ostia and Portus. Caselli (1990: 62) includes the site in a book for children where Portus' name appears on the map of Figure 13, while the entire site is only referred to as the "Claudian Harbour and Trajanic Basin" in a chapter on the Harbour of Ostia, giving an impression that it is a separate entity to Ostia. There is no relevant text to explain the relationship between the two locations or to give additional information.

Portus is also represented on a map in the chapter dedicated to Ostia, described as the foremost maritime harbour. The author mentions briefly the construction of two other harbours, the Claudian and Trajanic, to support Ostia (Figure 14).

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[94] Guastalla is the author's hometown and it is located in the north of Italy. The town is located less than 20 miles from the cities of Reggio Emilia, Parma and Mantova.
[95] Ministry for Archaeological and Cultural Heritage and Tourism
[96] The latest call for funding closed in February, 2020 https://www.cepell.it/it/finanziamenti-2019/bando-o-concorso/386-educare-alla-lettura-2019-on-line-il-bando-per-progetti-di-formazione.html

Figure 13 Image of Portus in a children's book (image from Caselli, 1990: 62-63).
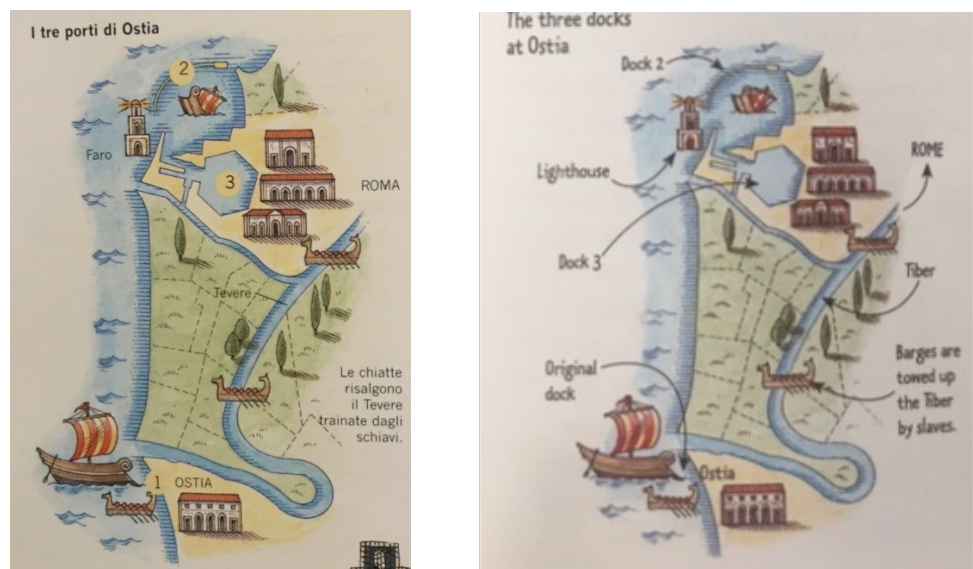
Figure 14 Images representing the three harbours of Ostia. The picture on the left is from an Italian edition (Sims, 2014: 44), and the one on the right is from an English version (Sims, 2014: 91).

Inside the image, the caption reads:

MERCI DA TUTTO IL MONDO
Nei magazzini del porto vengono scaricati ogni anno dieci milioni di sacchi di grano. Le navi che attraccano sui moli trasportano ogni genere di mercanzie: da Ceylon, spezie e gemme; dalla Grecia, vino e miele; dall'Asia minore, pergamene e cavalli; dalla Dalmazia, ferro e legname; dall'Oriente vetro e cuoio; dall'Egitto grano; dalla Spagna sale; dalla Britannia, rame e stagno.

Che
La comune nave da tr
la *navis oneraria*, lunga
una forma piuttosto tozza e
spinta da una vela quadrat
poppa ornata da un'*aplustre*,
collo di cigno. Dotata di una
è in grado di trasporta
(corrispondenti a una sta

Figure 15 Image of Portus as part of a chapter on Ostia (Denti, 1999: 40-41).

The third image (Figure 15) is an example of the misleading information available to Italian students. The image represents Portus, in the specific entrance of the hexagonal basin, but it appears again in a chapter dedicated to Ostia. Denti (1999: 40) mentions Emperors Claudius and Trajan have built two additional basins in support of Ostia, but whilst the image caption lists the types of goods imported and their provenance it does not mention Portus.

A similar review has been conducted across all six Southampton public libraries[97], where 22 children's books available to 8 to 15-year-olds on Rome and the Roman world have been found in the catalogue and analysed. Only two describe Ostia as the 'Port of Rome' (Mcdonald, 2007; Daynes, 2007), and only one has a map to locate the sites (Figure 14). The map is also the same used in the Italian edition.

Only one book, out of over 40 examined, uses the name 'Portus' to describe and illustrate Roman Harbours (Figure 16**Error! Reference source not found.**).

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[97] Bitterne Library, Central Library, Lortshill Library, Portswood Library, Shirley Libraries and Woolston Library. The Central Library hosts the School Library Service (SLS) which supports learning in schools by providing books, advice and IT for the school library.
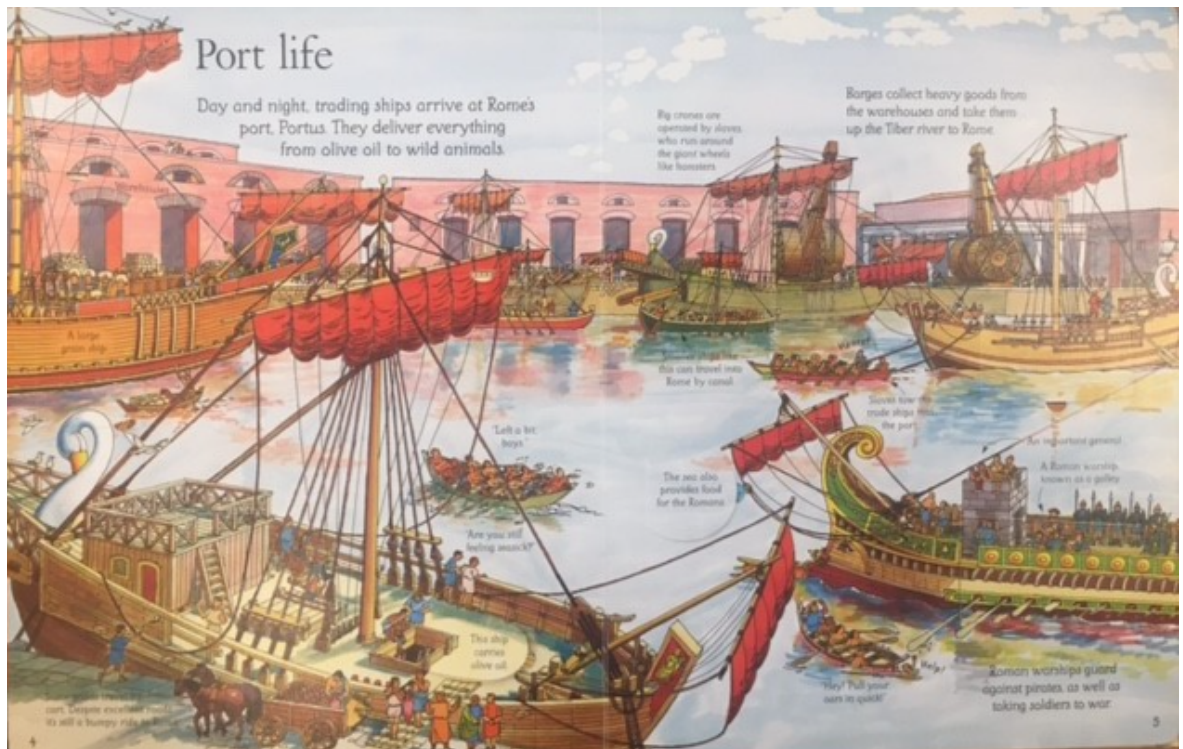
Figure 16 The illustration represents a scene of the hexagonal basin in Portus (Daynes, 2007: 4-5)

Burtt (1987) argues that books such the one I have used in the examples above still provide an educational experience, although misleading use of the images connected to unclear text could have an impact in the long term. Children could be biased towards an interpretation they are familiar with and might find difficult to accept alternative narratives, as this is not normally part of history books' structure.

1.7 Concluding thoughts

This introductory chapter has provided a brief background for the reader on the evolution of online learning, which has moved from simple reproduction of face-to-face classes to a more customised education. Despite the report commissioned by the UK Department of Education (DFE, 2014), little has been published on the use of MOOCs in the compulsory study in classes between 16-18 years of age. Italy seems to be a step behind the UK, where no study has been conducted yet, and online learning is currently offered only as an orientation to higher education or as part of the university offer. In contrast, in North America, the United States has studied and utilised MOOCs as an integration of STEM subjects taught in secondary school since 2004. Results have shown this has helped students to become independent learners but has not shown an increase in knowledge.

The author believes this might be related to the fact that the courses have been designed to substitute some of the classes rather than offer integrative content.

The analyses of a sample of MOOCs related to cultural heritage using an extended version of the well illustrate the complexity of the sector and the multitude of approaches utilised over the years. An increase in the number of online resources created connected to cultural heritage is noticeable from 2015 onwards, when more online courses have been produced and made available on various platforms. The course formed by the recording of lectures offered by Yale University appears incredibly distant from the courses hosted on platforms such as FutureLearn, Coursera and edX or to the course offered by #dariaTeach, where the content is tailored to the user and designed to facilitate engagement. Since 2013, there has been a shift into creating shorter and more general (e.g. Digital Humanities and Heritage) online courses that could be used flexibly to integrate face to face components and reused in different contexts. A move to the inclusion of more interactive content using blogs, applications and tours in addition to quizzes is visible across all the platforms. At the same time, the increased use of multimedia has also demonstrated how fragile is the long term digital sustainability of some of the resources developed.

With the development of the technology and the pedagogy applied to each case, it also appears essential to note that the launch of Europeana's MOOC targeting teachers demonstrates how critical is the need "to teach the teachers" (Conrads et al., 2017: 28) during this period of transformation of education processes into digital. The study presented in the following chapters aims to build upon this analysis and explore an alternative way to package content already produced in the area of cultural heritage and offer it to an audience that would not be exposed to it otherwise.

At a European level, heritage and culture are still part of the international debate and, in conjunction with communication and education, are recognised as tools to develop future citizens. This suggests that the fundamental role of online courses, such as the Archaeology of Portus MOOC, could be playing in this space when connected to education. The next couple of chapters will illustrate the steps that need to be taken to explore the full potential of the MOOCs. The Action Research method, as defined by McNiff (2013), will be applied through this thesis to evaluate the impact of an intervention rather than just measure outcomes. An initial mapping of equivalences between English and Italian secondary education systems was completed to allow the pilots to involve only Italian schools.

The second part of the introduction has illustrated the history of the site and the contribution of the extensive research work conducted by the Portus project over the years to identify five different periods of occupation (Keay et al., 2005; Keay and Paroli, 2011; Keay, 2012; Keay, 2013) that guides the Portus MOOC narrative, before focusing on its use following the collapse of the Roman Empire where the site was abandoned and flooded by water creating a hazardous area. Despite its limited occupation, Portus maintained a high profile under the Church-State and remained as private property until the modern-day.

The Torlonia family, first, and politicians, after, attempted to use the site as a tool to restore the glory of the Romans and link the community to their heritage, but failed. In this dispute between private and public, the local community has had access to the site as a public space for only three years. This short period of time contributed to the creation of new memories of the place and heritage. In the last five years, the local community of Fiumicino, in collaboration with national and local authorities, has worked hard to make the site accessible again in an attempt to attract visitors and reinstate the Portus-Ostia-Rome system. Due to the location of the site of Portus and the heritage information included in the material, the Italian speaking community was also identified as an important audience of interest. Despite the ongoing work, the site is still unknown to many and the online course could spark interest in the place to increase awareness of the site. This can be seen in some of the outcomes illustrated in the next couple of chapters.

The last section of this chapter introduces examples of visualisations in the heritage context, describing how cultural heritage practitioners are shifting the practice to more open and transparent communication of the decision-making process involved when creation representation of the past following the London Charter's principles. From the creation of applications and visualisations aimed at the public and promoted via a MOOC, to the development of a dynamic and interactive 3D platform to support a more transparent way to evidence decision making during the interpretation process, digital technologies are offering more opportunities to reflect on data available (Forte, 2014; Opitz, 2015; Dell'Unto, 2016), while encouraging new interpretations (Optiz and Johnson, 2016; Dell'Unto et al., 2017; Nicholls, 2019) and supporting data re-use (Optiz, 2018).

The chapter closes by analysing and demonstrating the limited visibility Portus has had in the media and books. Images and reconstructions list the Claudian Basin and the Trajanic Basin as separate entities of the Ostia Port System and never mention the site of "Portus". Only a few books aimed at children name the harbour and link it to an appropriate visual representation, while schoolbooks do not give space to this important site. It appears that

only TV documentaries and more the traditional press are offering an appropriate visual representation of the site, even if the Italian community uses different terms to describe the same site. Attempts to change this limited representation have created a different narrative through the Portus project via the creation of a MOOC and by the local authority and community with extensive work engaging schools in the proximity of the site. The data collected shows how Portus has been presented to the British and Italian community and validates the assumption that Italian students taking part in this research have not been extensively exposed to previous information about the site of Portus. Their participation can also help to assess the role of heritage MOOCs in making accessible new content not available otherwise.

Chapter 2   The Portus MOOC, Learning Objectives and Language Analyses

"'Simplifying' is too often understood as a synonym of 'impoverishing', but it is on the contrary indicating 'a cultural and elegant operation designed to subtract complication and to add meaning'"

(Lucarelli, 2001: 3)

This chapter focuses on the Archaeology of Portus MOOC, outlining Instructional Design and Bloom's learning theories before analysing their application to the online course and to the wider FutureLearn platform. This massive online open course embodies the essence of the Ground Tour where learners are guided through the online content by the course developers and by the educators in the group. Distributed over six weeks, a combination of videos, text and other multimedia resources present linearly all the methodologies and the technologies applied to the site of Portus, inviting learners to discover and interpret the different phases of occupation of the site with specialists. A series of additional content is provided through resources such Flickr, Twitter and the MOOC blog, which has also been completely translated to Italian. Each step in the course has been mapped to compulsory schooling learning objectives expanding the work started by Earl (2013) to show the full potential for reuse and integration that the Portus MOOC material brings.

The complexity of the language used could represent a barrier limiting participation and engagement with heritage information (Da Milano, 2009). Technical terms or complex concepts might be difficult to assimilate, especially if expressed in a foreign language. The second part of this chapter will look at the readability of the content produced in English and in its Italian translation to minimise barriers to engagement where possible.

2.1 Instructional design

Instructional Design (ID) can be defined as the sector that is internationally engaged in studying the criteria and teaching models applicable in different contexts, so that learning is likely to be effective, efficient and interesting (Calvani and Menichetti, 2015). The term Instructional Design also refers to the systematic process of applying principles derived from theories of learning and education to increase the quality of education (Briggs, 1977). ID is also based on the role of the educational designer or teacher, who must create

training plans, courses, teaching materials, and tests to support and assess learning. In order to examine the relationship between the design of resources and schools, we can start from the assumption that the words "effectiveness", "efficiency", "quality", around which the planning is based, are the same as those that have become the reference points of education policies, and in particular, the changes related to the school of autonomy in Italy (MIUR, 2012). This suggests a natural point of contact between ID and curricular design, two approaches characterised by the common purpose of promoting meaningful learning and maximising the educational success of all pupils (Capperucci, 2008; Castoldi, 2013).Nevertheless, those who deal with Instructional Design in Italy are facing a paradox: a discipline that is widely practiced abroad, both academically and professionally, to which books and magazine articles are dedicated, which offers to those who want to become experienced courses, masters, research fellowships and professional certifications, are in Italy unknown or only partially understood.

The historical origins can be identified through research into the use of images, films and television for educational purposes conducted in the early twentieth century in the United States[98]. The educational use of these, which were at the time "new media", go hand in hand with methodological reflection on how to use them in the classroom and to analyse their effectiveness in changing behaviours. As always in the United States, the Second World War sees great efforts by the armed forces in the search for methods capable of rapidly and effectively instructing a large number of soldiers on technically complex topics such as the use of radar. This effort leads to the creation of educational printed and audio-visual materials, new formats, and the first experiments of self-education systems. Another important influence coming from the school world is the rational approach to curriculum design, proposed by Tyler (1949) in the book, "Basic Principles of Curriculum and Instruction". Specifically, the Tyler-Objective, Education and Evaluation Oriented Principle applied to the curriculum design, is still relevant in the practice of ID. Equally important is the publication of the book by Bloom (1956), "Taxonomy of Educational Goals", which proposes a model for classifying didactic goals in terms of pupils' cognitive, psychomotor and affective processes. In particular, the cognitive domain is structured in six levels: knowledge, understanding, application, analysis, synthesis and evaluation, thus giving the educators the opportunity to set educational goals far beyond simply memorizing facts.

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[98] For a thorough historical reconstruction of Visual Instruction Movement and Audio-Visual Research, see Saettler (2004).

Since then, this model has found numerous applications in school education and adult education, and has inspired other successive taxonomies of educational goals. In particular, schools and universities need to teach an increasing number of students due to demographic growth, while at the same time ensuring the objective criteria for the effectiveness of education. In this scenario, a major area of research is that of Programmed Education (Callender, 1969), a teaching method based on the use of so-called "teaching machines" or text structured in a particular way. The design of this approach is the planning of the pupil's learning pathway through the definition of clear learning objectives, the fragmentation of content into small steps, the frequent application of questions and feedback, elements that will appear more or less identical even in subsequent developments of the ID.

The most noteworthy theoretical position in the field of 'Programmed Education' is that of Skinner (1968), for which the most important learning factor is positive reinforcement of the exact answers provided by the student. It would not be correct to identify Programming Education solely with Skinner's theory, as equally important is the contribution of ideas from the theory of communication, as in Crowder's Crowded Programming (1959), where the purpose of the feedback is not the reinforcement of the correct answers, but the error correction and the realignment of the pupil's knowledge through branched paths that bring it back to a previous step or to an alternating path (branching)[99]. Despite the positive results of many experiments, programmed instruction cannot be established on a large scale, mainly due to the high costs of content made in this mode. However, he inherits a large amount of studies and research on topics such as didactic design, feedback, learning rhythms, and evaluation of results, still fundamental to the search for effective education methods.

An important influence in defining the methods and tools of the ID, coming from the programmed statement, is that of the Criterion-Referenced Testing (Glaser, 1963) movement for measuring learning outcomes. In this approach, the criteria for test design are to be met, which is to measure pupil performance by comparing it with a predetermined or standard criterion that in school education coincides with the possession of certain knowledge or skills (unlike the "Norm-Referenced Testing Approach", at that

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[99] Significant in this regard are the studies by Postlethwait (1968; 1972), whose "audio-tutorial" system is one of the first examples of multimedia education. Postlethwait, who was a biology teacher, starts recording her lessons, then creates real "learning stations" where recorded lessons are available alongside laboratory tools, and uses slides and footage to support her lessons.

time popular in American schools, where pupils' assessment comes from a comparison between their score and that of other pupils)[100].

In the same period, Mager's (1962) contribution to the practice of introducing a method for writing behavioural goals is of great practical importance. In the Mager method, the behavioural objective must contain three elements: (i) a description of the performance that the teacher expects from the pupil as a demonstration of competence, (ii) a description of the conditions in which it will take place (e.g. in the case of a math test, the time available and the use of the calculator), and (iii) a description of the criterion for which it is considered acceptable (for example, the maximum number of errors allowed to pass the test).

Since the seventies, the concepts of didactic design introduced in the 1950s and 1960s found a more general application to the schooling world in Mastery Learning (Bloom, 1971), a method of classroom instruction. The basic principle of this method is that all pupils in a class can reach a high level of mastery of content if high quality education is ensured. In Bloom's thinking, the individual differences that are commonly encountered can be reduced by ensuring that lower grade students have more time to study and practice and receive appropriate reinforcement and correction feedback. In order to achieve this goal, the role of formative evaluation, which is understood by Bloom as the basis for assessment tests to be used as integral part of the training process. The purpose of the training evaluation is to identify at an early stage of education the strengths and weaknesses of each pupil, and identify the resulting integrative or corrective activities. Mastery Learning is one of the teaching methods that has been more widely studied over time, and numerous studies have highlighted the effectiveness and positive enjoyment of pupils (Kulik et al., 1990). However, its diffusion has encountered difficulties due to the greater workload for the teacher and the prevalence of a traditional approach to organizing class activities, perhaps overcome today by organizing activities in the mode of "upside class" (for an approach that integrates flipped classroom and mastery learning, see Bergmann and Sams, 2012).

2.2 Bloom's Digital Taxonomy

In the paragraph above, Bloom's taxonomy was introduced first as a main model for classifying didactic goals. Bloom and his collaborators collected and analysed thousands

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[100] For a description of the test development method and the results analysis techniques, see Shrock and Coscarelli (2007).

of judgments formulated by school workers and examination committees. From the data collected, Bloom and his team tried to derive the categories most frequently used in the evaluation and ordered them according to a hierarchical system consisting of levels in order of increasing complexity: knowledge, comprehension, application, analysis, synthesis and evaluation. Each level was then subdivided into additional sub-levels, and examples were provided for each level and sub-layer identified (Bloom, 1956).

Imagining Bloom's taxonomy as a pyramid (Figure 17), each level constitutes ascending steps to increasingly sophisticated forms of learning. Students must process a step-by-step order from bottom to top as follows:

- Before they can *understand* a concept they need to *know* it
- To be able to *apply* it they must have *understood* it
- Before being able to *analyse* it they have to be able to *apply* it
- To *summarise* it, they must first *analyse* it
- Finally, in order to *evaluate* it they must be able to *synthesize* it
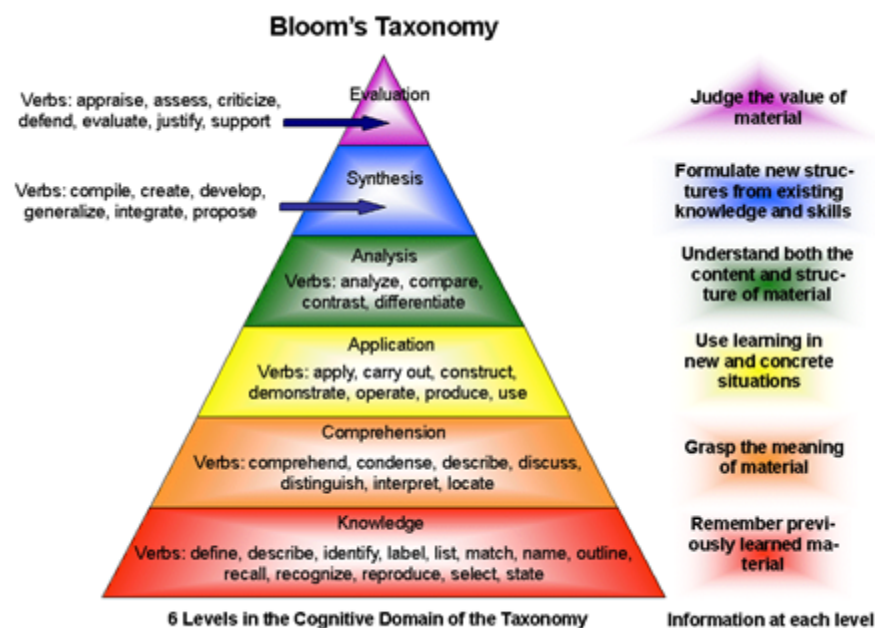
Figure 17 Bloom's Taxonomy as a pyramid. It also describes how learning evolves from simple to more complex performance (image from Marini, 2015).

The classification of cognitive learning objectives proposes the path that learning must follow, and provides a model of the cognitive structure of the mind and its dynamics. In this sense, it is not a simple arbitrary classification but a taxonomy that reflects the real

order that cognitive processes develop in learning and provides an objective representation of the reality it refers to (Marini, 2015).

The most relevant aspect of Bloom's theoretical levels of taxonomy while having immediate operational consequences is that learning is conceived as a sequential and linear process that proceeds through a series of well-defined phases, each of which is a condition for access to the next. On a practical level, this translates into a teaching strategy that goes from simple to complex and retains the goals of higher skills and competences at later stages of the student's formation and development, including their psycho-physical development.

This premise was considered excessively reductive and questioned by the subsequent developments in pedagogical research, according to which learning is a complex process and conceived according to a systemic paradigm (Anderson and Krathwohl, 2001). A revised version of the taxonomy was developed to adapt to the changes faced by teachers and students in the 21st Century, in particular, the results of cognitive psychology, curriculum theories and research in the field of evaluation.
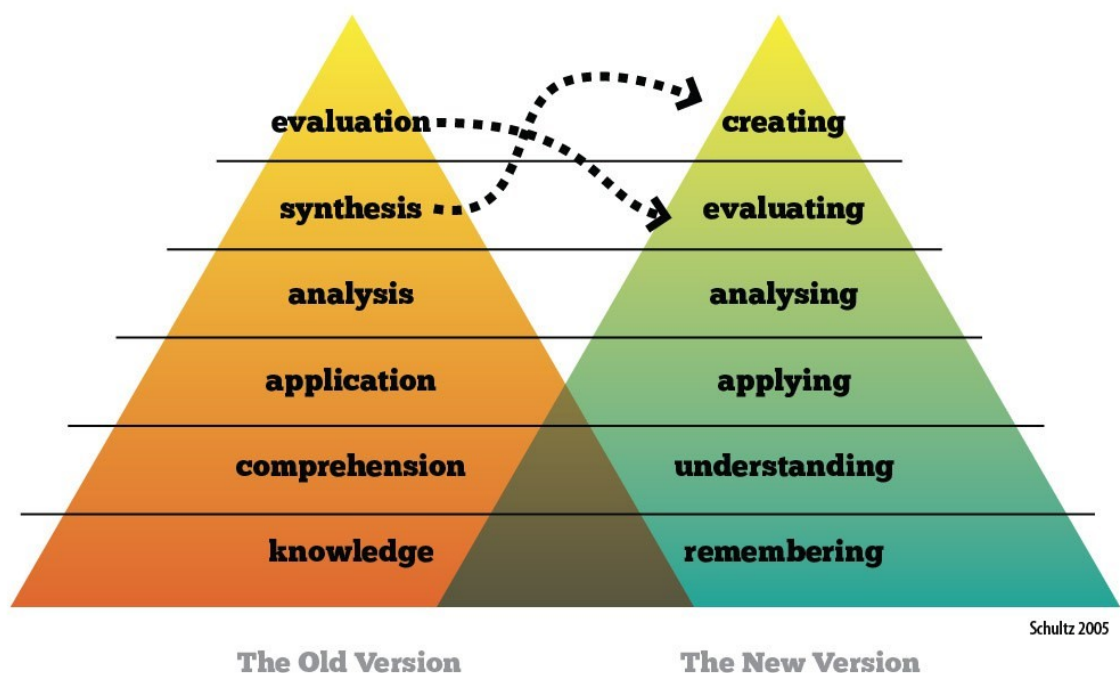
Figure 18 The figure illustrates the changes introduced in the Revised Bloom Taxonomy. (image from Shultz, 2005)

The revised taxonomy (Figure 18) introduces changes that may seem minimal, but are actually substantive modification of terminology. Verbs replace the nouns used by Bloom

to indicate the categories, and "knowledge" is replaced by "remembering". "Understanding" now indicates Bloom's "comprehension", and "evaluation" swaps with "synthesis" which is replaced by "creating".

Anderson and Krathwohl's review (2001) also introduce two main structural changes. Firstly, they introduces the distinction between lower levels of taxonomy, which constitute lower order cognitive abilities or Low Order Thinking Skills (LOTS), and high levels of top-level cognitive abilities or High Order Thinking Skills (HOTS). It then makes the taxonomy bi-dimensional by introducing the "Dimension of Knowledge" through which the different kinds of learning by type are articulated: factual, conceptual, procedural knowledge and meta-cognitive.

Figure 19 In the model, each of the coloured blocks show an example of a learning objective that generally corresponds with each of the various combinations of the cognitive process and knowledge dimension. (Heer, 2012)

The result of the intersection between *knowledge* and *cognitive processes* generates a grid of 24 cells (Figure 19) in which are reported the concrete operations and behaviours in which the type of learning is expressed. For example, *remembering* from a factual point of view involves the ability to list; from a conceptual point of view, to recognize; from a procedural point of view, to recall it; from the metacognitive point of view, to recognize and identify it.

	FACTUAL	CONCEPTUAL	PROCEDURAL	METACOGNITIVE
REMEMBER	*List* information relating to Portus	*Recognise* similar information across different sites connected to Portus	*Recall* information or events that took place at Portus	*Identify* key locations at Portus
UNDERSTAND	*Summarise* information and ideas relating to Portus	*Classify* archaeological material by type	*Clarify* how archaeological material and techniques can help in the interpretation of Portus	*Predict* what information can be obtained from the same type of material/technique
APPLY	*Respond* to other learners explaining information and ideas relating to Portus	*Provide* explanation on how	*Carry out* some basic research	*Use* a technique presented to create their own interpretation or 3D model of Portus
ANALYSE	*Select* a list of techniques of activities from the one presented	*Differentiate* outcomes presented based on material or technique applied	*Integrate* results with the theory presented during the course	*Deconstruct* personal bias in the information provided
EVALUATE	*Check* for consistency among sources	*Determine* relevance of results	*Judge* results presented based on what has been learned	*Reflect* on personal learning journey
CREATE	*Generate* new ideas based on the data provided	*Assemble* ideas from different areas presented	*Design* new way to analyse and interpret data	*Create* innovative interpretation

Table 5 Anderson and Krathwohl's review applied to the Archaeology of Portus MOOC.

In 2008, the scope of Bloom's model was extended by Andrew Churchs to include digital technologies. Churchs believes students should be prepared to think, adapt and modify their ideas. In order to obtain this outcome, educational technologies should be integrated in the teaching methods and not only used as support by teachers. The categories in Anderson and Krathwohl's model were associated with the behaviours, problems, processes and actions that are not currently represented yet: web 2.0, information overload, constant growth of ubiquitous and personal technologies, cloud computing, etc. Bloom's digital taxonomy is not really about technology, but its use to facilitate and improve learning. It emphasises is not so much the outcome of the lessons learned, but also the quality of processes and products.

The table in Figure 20 provides a synoptic and comparative representation of the three versions of Bloom's taxonomy, in which the various capacities/abilities appear as otherwise stated in the three taxonomies.

Figure 20 The table compares Bloom's taxonomy with the two major reviews conducted by Anderson and Krathwohl in 2001, and Churchs in 2009 (image from Grantham, 2014).

The Bloom *Extende*d Digital Taxonomy provides an additional level of competencies/goals identified in *sharing*, while "*analysing*" becomes *conceptualising* and *understanding* becomes *connecting*. There are also two additional columns showing the functional levels, cognitive behaviours in which the various cognitive abilities identified at different levels of taxonomy are operative, and activities carried out with digital instruments. This latest extended model is the one that best adapts to the case study presented in this thesis as it is a complete representation of the way in which digital information is produced and consumed nowadays.

2.3 FutureLearn Learning Design

The University of Southampton was one of the twelve initial partners of the FutureLearn platform launched in 2012, with the first MOOCs opening in later 2013. FutureLearn (FutureLearn, 2018: 7) cited the study of Meltzoff et al. (2009) around infant and machine learning, and highlighted social learning as a powerful learning tool as a catalyst to the

creation of the online learning platform. FutureLearn pedagogy is based on three simple principles as a foundation for Conversation Theory, Active Learning and Social Learning:

- Telling stories, where an open storytelling narrative is used to support the link between the different elements of the course
- Provoking conversations, where conversations and exchange of ideas between students or with an educator are core to learning
- Celebrating progress, where learning achievement (e.g. completed steps, interactions and quizzes) are visualised to show individual progress.

These principles are visible across all the course structure, which is organised in *steps* that are forming *activies* in periods of study, called *weeks*. Each activity should have a defined goal, learning methods, learning outcomes based on Bloom's Taxonomy of Educational Objectives (1956) presented earlier and is associated to element of pedagogy. These are derived from Laurillard's learning types (2012), focusing on what it is the learners are *doing* as they move through a course rather than what it is we are *presenting*, and lead to learner-centred course design decisions. and used as learning designer tool:

- Receive: Learners watch video, listen to audio, review images and diagrams, watch animations and read text or short articles.
- Investigate: Guiding the learner to explore, compare and critique the concepts and ideas being taught
- Collaborate: Learners work together to search for understanding, meaning and solutions or to demonstrate their learning by creating something.
- Discuss: Learning through conversation. All steps in a course lead to conversation through commenting and social interaction.
- Practice: Enable the learner to adapt their actions to the task and use peer feedback and reflection to improve their next action.
- Create: Production enables learners to consolidate their learning by creating real outputs using their current knowledge.
- Reflect: enable learners to reflect on their learning and discuss it with other learners.

The table below The Archaeology of Portus course design mapped against the pedagogy from the Italian schools and FutureLearn (Table 6) illustrates how well the Archaeology of Portus course design mapped against the pedagogy from the Italian schools and FutureLearn.

Italian school pedagogy	Course content	Course learning objectives
Develop Communication Skills	Sharing thoughts and comments with other learners	Collaborate with others to explain and summarise information and ideas relating to Portus.
Develop an understanding of archaeological and heritage terms	Learn new concepts	Demonstrate an understanding of key archaeological terms such as "context" and "stratigraphy".
Develop communication skills	Describing ideas to others in a clear and efficient way	Explain and illustrate your ideas and understanding of Portus by reference to examples, in a way that others can understand.
Demonstrate ability to relate places and timeline	Use information to create links between different areas	Describe the archaeology of the Tiber delta and its relationship to Rome and the Roman World.
Develop interdisciplinary understanding and skills	Reference and link methodologies to context	Explain archaeological field techniques and site recording methods in terms of their context of use and potential results, and their role in understanding Portus.
Understand relationships between different historical time periods	Describe differences between terminologies across the time	Visualise the harbour at different periods of time and from different perspectives.
Demonstrate ability to link knowledge to local community and territory	Describing personal experiences	Demonstrate an understanding of the archaeological approaches used at Portus by reference to your own knowledge and surroundings.

Table 6 The Archaeology of Portus course design mapped against the pedagogy from the Italian schools and FutureLearn

2.4 The Archaeology of Portus MOOC

In 2014, the University of Southampton ran a MOOC on the archaeological work in progress at the Roman site of Portus for the first time. Since then, the course has run another five times until 2018.

The course wanted to appeal to people interested in Roman history, archaeological methods and the site of Portus as well as appeal to prospective students interested in a more formal education pathway. It was built around six consecutive weeks of study, where learners were initially expected to undertake approximately 2 hours, extended then to 4 hours, of activity to complete core course materials, and the content for each week was organized around five specific themes:

1.   The archaeological site of Portus and the surrounding area, in terms of its historical context, related written records, and its archaeological and architectural data.

2.   Archaeology at multiple scales, from the Roman Empire, via the Roman Mediterranean, landscapes, the port, and individual buildings down to unique artefacts.

3.   The Roman people who lived, worked and died at the site.

4.   The range of multidisciplinary methods and theories that are in place at Portus, including techniques, data, values, and ethics.

5.   The uses and implications of a range of the archaeological digital techniques in use at Portus, to record, analyse, interpret and present the site.

Figure 21 An overview of the FutureLearn Portus MOOC structure.

The themes are represented in the learning material in six distinct sections (Figure 21), to represent the six weeks of the course, as follows:

Week 1 - The Port of Claudius and the Roman World

Figure 22 An overview of Week 1 structure.

After an introduction to the course structure and content, this section focuses on the first stage in the life of Portus with its establishment under the Emperor Claudius. Learners explore the place of the port both in the wider history of Rome and in the geographical context of the Tiber Delta (Figure 22). Connections between Portus and the rest of the Empire are drawn through a range of evidence, including pottery characteristic of this period. The archaeological work at Portus is also placed into a disciplinary context examining the ways in which archaeology is undertaken now, how it has been practiced in the past and how interdisciplinary approaches from archaeological science and historical analysis teach us more

about the site. The monumental Claudian portico, whose colonnaded frontage proclaimed Rome's wealth and power to everyone arriving at Portus by sea, is the monument explored in this week. The also week includes two discussions and two quizzes to engage and involve learners. Learners are also invited to "imagine themeselves as a provincial traveller arriving at the port for the first time in the mid-1st century AD, the time of Claudius. What do you imagine you would see? What kind of buildings would you expect to find in the port?...You can reflect on this later when you have learned more about the site" (step 1.8). The aim of the activity is to identify similar and different viewpoint in the cohort. Learners are sharing their imaginative journey based on their personal background and experiences and putting focus on their personal journey. This is a typical c-mooc feature.

Week 2 - Trajanic Connections - Portus, Ostia and Rome
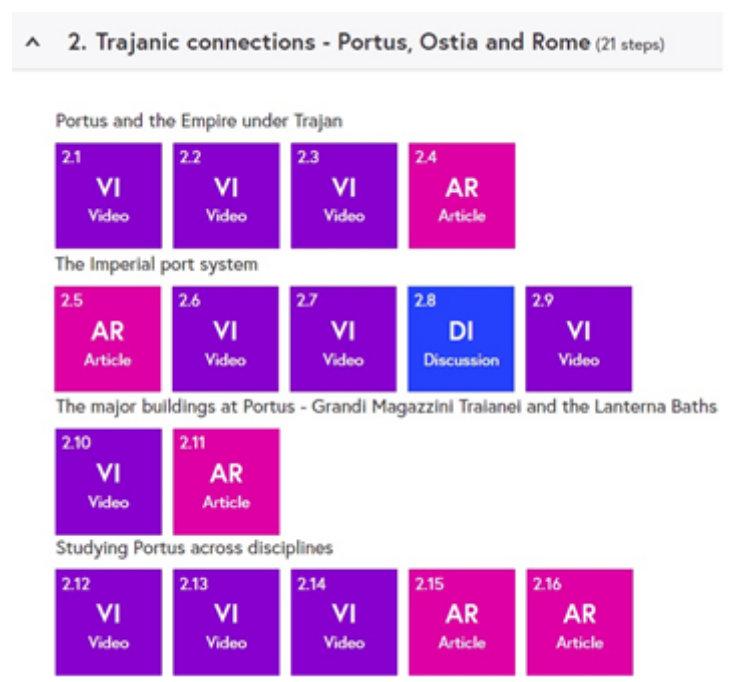
Figure 23 An overview of Week 2 structure.

This section (Figure 23) introduces learners into the world of the great soldier — Emperor Trajan. His success in conquest led to the Roman Empire reaching its greatest ever extent, and provided the resources and the need for a better port system serving the city of Rome and the Empire. The Trajanic hexagonal basin expansion was created to provide a much enlarged and safer harbour, which together with smaller surrounding ports and channel infrastructure made up Rome's monumental maritime facade. The Trajanic

warehouses, located at the heart of port, and the bath complex are the key buildings explored in this section with the related artefacts. This week, like the next, will reflect an x-mooc model that is similar to a traditional classroom dissemination model from teacher to student. This is due to the information involved, such as the scale of analyses, or the methodologies introduced. However, activities such as discussion and quizzes have been designed to encourage learner's conversation and exchange of ideas. This allows learners to engage on a personal level with the topics covered supporting a personalised learning experience (Priniski et al, 2018). The scale of analysis is reduced slightly to consider in detail the port system of Portus, Ostia and Rome, and the connections between these places. On the methodology side, geology, palaeobotany and zooarchaeology are introduced as complement to archaeology to understand the history of the hexagonal basin. Only one discussion step is included.

Week 3 - The Age of Septimius Severus - the Port Hinterland

Figure 24 An overview of Week 3 structure.

This section (Figure 24) of the course explores the later second century AD, when a series of developments at Portus took place during the reign of emperors such as Antoninus Pius, Marcus Aurelius and Septimius Severus. In this historical period, Rome

and Portus were at the heart of the prosperous Roman Empire which included many cities and ports.

The focus is on the landscape surrounding the port, and on the methods available to study archaeology in a non-destructive way at this scale, namely geophysics and geology. The Grandi Magazzini di Settimio Severo, the monumental three-storey storerooms, and the marble route through the harbour and on to Rome, are the building and materials examined in this section. Two quizzes and two discussion steps are also included.

Week 4 - Excavating Portus from the Time of Constantinus
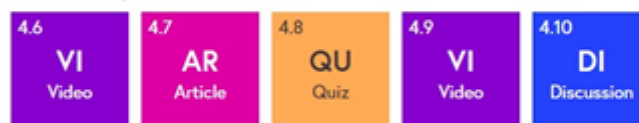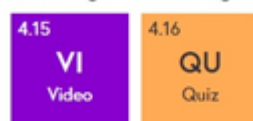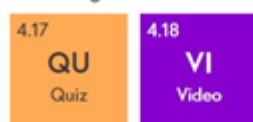
Figure 25 An overview of Week 4 structure.

The third and fourth century occupation of Portus, in the time of the Constantinian Dynasty and other "Late Antique" Emperors, is covered in this section (Figure 25). The scale is also reduced from landscape down to the excavation of individual buildings. Excavation,

recording and conservation of materials are the methodologies covered in this section, as they are crucial to understand the site in detail and preserve it. The structure known as Building Five is presented this week, while coins are among the different categories of objects we discover in this section.

Week 5 - Finds from the World of Theodoric the Great

Figure 26 An overview of Week 5 structure.

This section (Figure 26) introduces the last years of activities of the port in the later fifth to the seventh centuries, including the reign of Kings and Emperors such as Theodoric the Great and Justinian, and the fragments of traded goods discovered on the site. The scale of the analyses is reduced again, from buildings to individual objects that can support studies into the definition of the site history across time and space. This section explores the Basilica Portuense, the only certain Christian building on site, and on some artefacts

connected to religious practices. Scientific methods such as photogrammetry, laser scanning and reflectance transformation imaging are introduced in this section.

Week 6 - Revisiting Portus – Across Space and Time
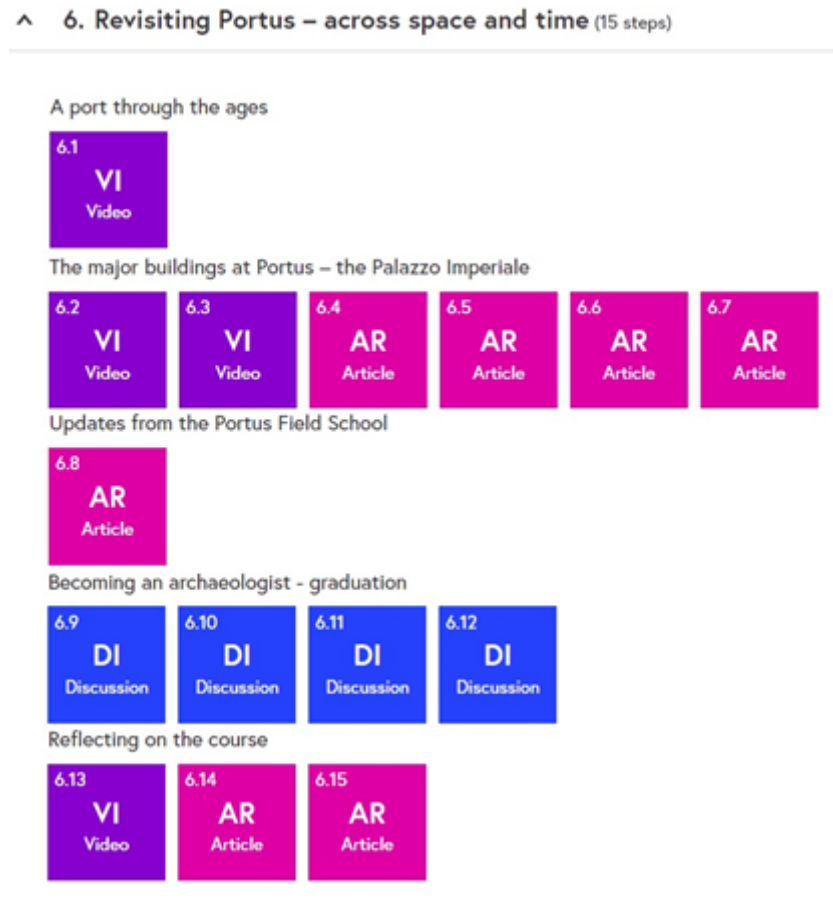
Figure 27 An overview of Week 6 structure.

In this final section of the course (Figure 27), learners explore how all of the archaeological techniques presented can be used together to create a detailed picture of the port, its history and significance in the Roman world. Furthermore, learners are invited to think about how the finds from Portus lend information about individual buildings, and how in turn these buildings fit together in the landscape —controlling and being controlled by the people whose remains were studied in the previous section. This section contains videos showing insights into the excavation using virtual access to the excavation area. Learners will explore the Imperial Palace and study its components including the great portico overlooking the Claudian basin, an amphitheatre, and beautifully decorated private rooms. Learners are encouraged to generate personal interpretations and ideas for further research on the site and online through the discussion steps. During the first run of the course (2014), this section overlapped with the Portus 2014 Field Season, which hosted

undergraduate archaeology students and Curriculum Innovation Programme[101] students from the University of Southampton. The overlap between The Portus Field School and the MOOC allowed a deepening of the concept of 'social learning', where the students in the field become instructors on the course by replying to questions online and via videos and by sharing newly acquired knowledge.

Following this structure, learners would have covered a new period of Roman history in chronological order and examined a new approach to archaeology (such as geophysics, satellite imagery or excavation) each week. Furthermore, they would have studied one of the many surviving buildings, and also looked at how the finds of that period shape our understanding of the place, its trade with the rest of the ancient Mediterranean, and the connection with the people who lived, worked, and died there. Each week terminates with an activity, a quiz and a summary of the week including new associated visual and online resources.

Whilst learners can engage with the content of the course in any order they would prefer, the course's facilitators provide focused discussion and interaction with the learners following the weekly plan. Videos (no more than 5 minutes long) were largely filmed on location, at Portus, and are largely used during the duration of the MOOC to explain key concepts, introduce new researchers and as a practical demonstration of specific concepts (e.g. the difference between materials or to explain particular techniques). Transcripts and subtitles have been provided in Italian to support engagement with the Italian community. Learners were also encouraged to explore the Portus website, the Portus MOOC website and other resources more freely. Both websites presented extensive Italian translations. The order that these followed was the same as the MOOC timetable, and this is one of the ways in which the Portus Field School, which took place on site during the last week of the first run, and the Portus MOOC have been blended. The blog also provides non-linear routes through the MOOC, developed via tagging, as it was not possible to have a similar functionality in FutureLearn. The standard categories for the blog and the MOOC were Week 1, Week 2 etc., and tags were used to allow access via period (e.g. Claudian, Trajanic) or scale (e.g. Roman World).

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[101] The Curriculum Innovation Programme, introduced at Southampton in 2011, was designed to give students a new perspective and access to innovative approaches to teaching and assessment. Students were encouraged to take interdisciplinary modules set at second-year level to broaden their study and develop transferrable skills.

### 2.4.1	Learning objectives

The previous paragraph introduced the Archaeology of Portus MOOC's structure and themes and the additional learning material produced to support learners. While the MOOC was initially intended for the general public or prospective students, the following learning outcomes have been designed to support students' learning at different stages of thinking skills:

1. Students can reflect on the site of Portus in relation to its geographical and historical context from current research.
2. Students can provide an analysis of how archaeologists, together with historians and epigraphers, can unravel the history of the site of Portus.
3. Students are able to understand and differentiate the range of data, techniques, and interpretations currently employed at Portus.
4. Students can evaluate multidisciplinary methods and theories in the context of archaeological fieldwork.

As a result of the initial positive engagement with the MOOC, an archaeology module titled, "The Archaeology of Portus: Exploring the Lost Harbour of Ancient Rome" was developed to support undergraduate and master's students in 2016/17. This module built upon the experiences running that online course and also of the materials generated for it, all of which were produced by or are licensed for use by the University of Southampton. Wherever possible, the module was planned to coincide with the running of the MOOC and students were encouraged to participate in the online course to develop a new learning experience while benefiting from the experience of learning alongside a diverse online community.

The newly planned module is innovative in its delivery and is particularly suited to students wishing to experiment with a variety of learning and teaching approaches and to demonstrate their ability to work and to collaborate in a digital environment. Students based at Southampton were able to access the content online, as all steps have been made openly available. Despite the enrolment on FutureLearn, it is not required as part of the module, and students are strongly encouraged to engage with the other MOOC learners to maximise the benefits form this type of participation.

Irrespective of enrolment on the MOOC, students are required to learn entirely online for this module with some blended learning activities, and some of this online learning and teaching will take place as scheduled contact time. While the initial six weeks of the module are designed in parallel with the MOOC, the following weeks are focused on self-

directed study undertaking research for a final assignment relating to these themes, but independent of the MOOC.

Students have also been provided with an online study guide to use alongside the online materials that provide suggested resources to expand their knowledge and understanding and to enable each student to apply their own learning through the comments and submission of assessments.

The creation of the additional module required an extension of the learning objectives map initially created for the Portus MOOC created on Bloom's digital taxonomy and to the Qualification and Credit Framework (QCF) levels (Table 7). The table below shows the MOOC was initially created at a QCF level 4 equivalent and how well the module supported undergraduate and postgraduate students by deepening Bloom's stage descriptors. Whilst the following define the minimum thresholds for each level, students can be expected to exhibit higher level skills at lower levels, e.g. MOOC students might choose to explore published sources and Level 6 students might develop wholly new interpretations from primary data.

For the purpose of this study, I have extended the existing learning objectives to include QCF entry level 3 to 7 and to show the full potential for reuse and integration that the Portus MOOC material has. The association between stage descriptors and QCF levels has been provided by examining both Italian and English systems.

Bloom Stage Descriptors	Entry Level 3	Level 1	Level 2	Level 3	MOOC/ Level 4 (e.g. Certificate/ HNC)	Lev
DOING	Identify the key elements of the history of Portus. Ability to recognise different types of fonts (e.g. historical texts, archaeological).	Understand the basic aspect of historical research and fonts.	Identify different cultural areas represented at Portus.	Recognise and identify Roman archaeological materials.	Identify key locations at Portus on an interactive map. Visualise the harbour at different periods of time and from different perspectives.	
CONNECTING	Demonstrate knowledge of elements of Portus' history and the most important people connected to the site. Ability to divide the information offered on Portus by subjects.	Demonstrate an understanding of key building and their function. Ability to recognise different information from more than one font.	Demonstrate the ability to use key fonts and compare them. Describe the port in a multidisciplinary way. Demonstrate an understanding on how historical facts could be linked to current politics.	Summarise blog posts and online material related to Portus and link it local history. Collaborate with others to explain and summarise information and ideas relating to Portus.	Demonstrate an understanding of key archaeological terms such as "context" and "stratigraphy". Describe your own imagined Portus. Describe the archaeology of the Tiber delta and its relationship to Rome and the Roman World. Explain archaeological field techniques and site recording methods in terms of their context of use and potential results, and their role in understanding Portus. Demonstrate an understanding of the archaeological approaches used at Portus by reference to your own knowledge and surroundings.	Describe current k archaeol Demonst archaeol methods undertak work at t
APPLYING	Ability to read and build a timeline and conceptual map.	Discovery historical links to the local territory (e.g. the Roman settlement).	Ability to illustrate how historical facts could relate to modern history in relation to different disciplines.	Explain the similarity between historical facts related to Portus and events which happened in another geographical location or historical period.	Explain and illustrate your ideas and understanding of Portus by reference to examples, in a way that others can understand.	Explore t seen in a reports a associate their valu archaeol Apply kn archaeol

Descriptors					(... HNC)	
CONCEPTUALISING			Compare ancient fonts in the original language and reference back to the site of Portus.	Research and compare digital sources available in relation to Portus	Compare and contrast Portus at different stages in its history. Plan your ideal visit to Portus in order to tell part of the site's history.	
EVALUATING				Synthesise basic information provided about Portus and created a Wikipedia entry.		Synthesi… about Po… available… define ne… site.
CREATING			Reflect on the different scales of analysis made possible by the evidence and archaeological methods available at Portus.	Create a simple 3D model or Portus based on the plans provided.	Create a Wikipedia page with information about Portus. Create 3D models of Portus	Reflect o… analysis… evidence… methods… Debate t… archaeol… approach…
SHARING				Share the models created in the appropriate 3D viewer.	Share information from the MOOC on social media.	

Table 7 The table lists the learning objectives of the Portus MOOC developed by Prof Graeme Earl (for Level 4 to 7) on the bases of the University of S…
outcomes, and in turn on the national grading levels, and by the author for entry from Level 3 to Level 4.

2.4.2 Analyses of steps included in the MOOC

This section will extract all steps included in the MOOC related to 16 to 18-year-olds' learning objectives and complete a content analysis of the steps. This will define how well and which steps in the course fit with the current Italian curriculum.

The Italian ministerial legislation provides a simplified document attempting to verticalize the curriculum of studies. It also includes "knowledge and skills" which will be achieved at the end of the previous cycle of study (see Chapter 3 for more information on the different education systems) in accordance with the relevant guidelines while aiming at achieving a "hoof of knowledge and skills" common to all educational strands.

Subjects such as Italian language and literature, foreign language and culture, mathematics, history and sciences have been identified as pivotal disciplines in addition to some shared clusters of knowledge in order to guarantee the achievement of common knowledge and skills (and also in order to provide all the cultural tools useful to exercise their citizenship, to access higher education, and to be able to continue learning throughout their entire lifespan). These favour the eventual reorientation and transition from one path to another for the purpose of combating school dropouts and educational successes.

The national directions (Indire, 2019) call into question "the competition and the full exploitation of all aspects of school work: the study of disciplines in a systematic, historical and critical perspective; the practice of investigation methods proper to the various disciplinary fields; reading, analysis, translations, philosophical, historical, scientific, essay and interpretation texts and art; the constant use of the laboratory for the teaching of scientific disciplines; the practice of argumentation and comparison; taking care of a correct written, oral and pertinent expository modality; the use of multimedia tools to support study and research ". These are aspects that are duly referred to in the text of the national indications, which underline and innovate the cornerstones of the high school tradition.

It also indicates the learning outcomes common to high school education, divided into the five areas

1. *Methodological.* This means having acquired an autonomous and flexible study method, which allows for conducting personal research and in-depth studies and effectively continuing subsequent higher studies, a natural continuation of the high

school courses, and being able to update oneself throughout the entire lifespan. Be aware of the diversity of the methods used by the various disciplinary fields and be able to assess the reliability criteria of the results achieved in them. Knowing how to perform the necessary interconnections between the methods and contents of the individual disciplines.

2. *Logical-argumentative.* This means knowing how to support one's own thesis and knowing how to listen and critically evaluate the arguments of others. It means acquiring the habit of reasoning with logical rigor, of identifying problems and of identifying possible solutions. It means being able to read and critically interpret the contents of the various forms of communication.

3. *Linguistic and communicative.* This means fully mastering the Italian language, and in particular: master writing in all its aspects, from the elementary (spelling and morphology) to the more advanced (complex syntax, precision and richness of vocabulary, including literary and specialist vocabulary), modulating these skills depending on the different contexts and communication purposes; knowing how to read and understand complex texts of a different nature, grasping the implications and nuances of meaning specific to each of them, in relation to the typology and the relative historical and cultural context; taking care in oral presentation and knowing how to adapt to different contexts. It means having acquired, in a modern foreign language, the structures, methods and communication skills corresponding at least to Level B2 of the Common European Framework of Reference. It means knowing how to recognize multiple relationships and establish comparisons between the Italian language and other modern and ancient languages, and knowing how to use information and communication technologies to study, conduct research, and communicate.

4. *Humanistic historian.* This means knowing the cultural assumptions and the nature of political, legal, social and economic institutions, with particular reference to Italy and Europe, and understanding the rights and duties that characterize being citizens. It means knowing, with reference to the events, the geographical contexts and the most important characters in the history of Italy in the European and international context, from antiquity to the present day. It means being able to use methods (spatial perspective, human-environment relations, and regional synthesis), concepts (territory, region, location, scale, spatial spread, mobility, relationship, sense of place, etc.) and tools (maps, geographic information systems, images, statistical data, and subjective sources) of geography for the

reading of historical processes and for the analysis of contemporary society. It means knowing the fundamental aspects of Italian and European culture and literary, artistic, philosophical, and religious traditions through the study of the most significant works, the authors and currents of thought and being able to acquire the necessary tools to compare them with other traditions and cultures. It means being aware of the cultural significance of the Italian archaeological, architectural and artistic heritage, of its importance as a fundamental economic resource, and of the need to preserve it through the tools of protection and conservation. it means being able to place scientific thought, the history of its discoveries and the development of technological inventions in the broader area of the history of ideas. It means knowing how to enjoy the creative expressions of the arts and expressive means, including entertainment, music and visual arts. It means knowing the essential and distinctive elements of the culture and civilization of the countries whose languages are studied.

5. *Scientific, mathematical and technological.* This means understanding the specific formal language of mathematics, knowing how to use the typical procedures of mathematical thinking, knowing the fundamental contents of the theories that are the basis of the mathematical description of reality. It means possessing the fundamental contents of the physical sciences and natural sciences (chemistry, biology, earth sciences, and astronomy), mastering their own procedures and methods of investigation, and also being able to orient themselves in the field of applied sciences. It means being able to critically use IT and telematics tools in study and research activities; understand the methodological value of computer science in the formalisation and modelling of complex processes and in the identification of resolutive procedures.

and, finally, describes the peculiar results to each secondary education pathway.

Looking at opportunities to link to the Italian curriculum, the following subjects offer potential to match the learning resources produced and can be mapped to the Portus MOOC themes introduced earlier:

1.   The archaeological site of Portus and the surrounding area, in terms of its historical context, related written records, and its archaeological and architectural data.

2.   Archaeology at multiple scales, from the Roman Empire, via the Roman Mediterranean, landscapes, the port, individual buildings down to unique artefacts.

3.   The Roman people who lived, worked and died at the site.

4.   The range of multidisciplinary methods and theories that are in place at Portus, including techniques, data, values, and ethics.

5.   The uses and implications of a range of the archaeological digital techniques in use at Portus, to record, analyse, interpret and present the site.

Using the table below (Table 8), it is easy to see how archaeology and all the material created for the MOOC can fit into different curriculum subjects. In addition, the work placement offers the opportunity to map some of the more practical activities developed for the MOOC (e.g. building a 3D model of Portus) to the Italian curriculum.

Subject	Content	Competencies
Geography	The landscape, urbanization, globalisation and its consequences, cultural diversity (languages, religions), migrations, population and demographic issues, relationship between economy, environment and society, geopolitics.	Ability to describe and place on a map basis, also through the exercise of reading the mute cards... Mediterranean and European area). Ability to summarise and create a picture of the environmental, demographic, political-economic a... comparisons and scale changes. Understanding of fundamental factors for the settlement of peoples and the establishment of state... existence or otherwise of natural boundaries, navigable waterways and other waterways), commu... dislocation of raw materials, migratory flows, language areas and the spread of religions.
History of Art	The value of the archaeological, architectural and artistic Italian heritage, essential aspects of issues related to conservation, conservation itself and restoration.	Ability to correctly frame the artists and works studied in their specific historical context; knowledg... appropriate method and terminology. Understanding the close link between the political dimension of art and architecture in Rome. Ability to recognize and explain the iconographic and symbolic aspects, stylistic characters, funct... Finally, the student is aware of the great cultural value of the archaeological, architectural and art... essential aspects of the issues related to conservation and restoration.
Foreign Language and Culture	Development of opportunities to use the foreign language for the comprehension and oral and written elaboration of contents of non-linguistic subjects. Virtual and in-person exchanges, individual visits and study stays, training courses in Italy or abroad (in cultural, social, productive, professional contexts) can be integrated into high schools.	Understanding in a global, selective and detailed way oral/written texts related to areas of interes... Ability to produce structured and coherent oral and written texts to report facts, describe phenom... appropriate arguments. Participating in conversations and interacts in the discussion, even with native speakers, adequa... context. Reflecting on the system (phonology, morphology, syntax, vocabulary, etc.) and on linguistic use... pragmatic aspects, etc.).
History	The two space-time dimensions must be an integral part of the learning of the discipline. An adequate space can be reserved for activities that lead to the evaluation of different types of sources, to read historical documents or to compare different interpretative theses; this in order to understand the ways in which scholars construct the story, the variety of sources used, the succession and the opposition of different interpretations.	Knowledge of the main events and long-term transformations in the history of Europe and Italy, fr... context of the global history of the world. Appropriate uses of the vocabulary and interpretative categories of the discipline. Ability to read and evaluate the different sources and recognition of the contribution of disciplines... palaeography. Ability to look at history as a significant dimension to understand, through a critical discussion an... and interpretations, as the roots of the present.
Latin Literature and Culture	The founding values of Roman classicism for the European tradition in terms of genres, imaginary figures, and identify through texts, in their quality of historical documents, the most significant traits of the Roman world in all its religious aspects, political, moral and aesthetic.	Understanding of the Roman literary culture as a whole and its impact on the Western tradition: t... of texts; the concepts of originality, creativity and imitation; the importance of literary genres; the... social and political context; the ways in which the Latin literary heritage is selected, preserved an...

Table 8 This table shows how the content from the Archaeology of Portus MOOC can be mapped to different curriculum subjects

2.5 Access and Language

Access, participation and representation have been identified as the mechanisms that allow an audience to fully experience the museum or site experience (Da Milano, 2009)

Access development is a policy model that is rooted in Europe's 1950s and 1960s, when the welfare idea of "democratisation of culture" became popular. Its goal was to ensure equal access to culture by identifying specific under-represented groups, setting up activities/programmes aimed at promoting their participation, and the removal of specific barriers, whether physical, intellectual, cultural/attitudinal or financial.

Traditionally, access issues were mostly associated with architectural and financial barriers (which still represent one of the main barriers today as obstacles to participation, especially in the case of disadvantaged users). Only recently has more attention paid to more "immaterial" types of barriers, such as sensory and cognitive barriers, cultural barriers (interests, life experiences), aptitudes (the culture and the overall atmosphere of an institution) and technological (lack of ICT use to enhance access to cultural offerings), class-based perceptions (e.g. perception of cultural institutions as exclusive places, reserved for educated and sophisticated people; refusal of certain forms of cultural expression, considered to be of little interest or offense; and low priority given to cultural participation) (Victoria & Albert Museum, 2006; 17; Solima, 2012; 33).

In relation to communication via online media, this happens mainly visually, symbolically and textually. Communication, especially textual, is just one of the tools that archaeologists have available to create a bridge between heritage and the public. Like every other form of communication, it is rich in complexity and not always easy to control, but archaeologists have a duty to try to manage, at least partially, this complexity and to critically and realistically evaluate their communicative choices.

In the last decade, the problem of text readability has acquired attention from different disciplines, and indices have been popular, thanks to the development of information technology which has made it easy to apply; an example of this is the numerous readability analysers available online[102]. te Molder and Potter (2005: 3) defined language as a 'medium of action', while themes are seen to be characteristic of particular forms of communication and are explored by Stubbs (2002). In this study, I will focus on the

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[102] An example is https://labs.translated.net/leggibilita-testo/ for Italian and http://www.readabilityformulas.com/free-readability-formula-tests.php for English.

content and the style of language used which can be measured using quantitative methods and word pattern analysis (Pennebaker et al., 2003).

Characteristic approaches to quantitative language analysis involve the identification and coding of similar patterns (e.g. lexical complexity and word and phrase frequency) and the interpretive content supported by statistical tests of significance (Lent, Agrawal and Srikan, 1997; Curtis et al., 2001; Hsieh and Shannon, 2005; Khawaja, Chen and Marcus, 2010; Tausczik and Pennebaker, 2010).

The English language, contrary to Italian, distinguishes two different types of legibility. The first refers to 'legibility' as written or printed words that are "clear enough to be read easily" (Hornby and Cowie, 1995 – Oxford dictionary) referring mainly to calligraphy or the typographic font used. The second refers to 'readability' as "to look at and understand the meaning of written and printed words or symbols". Readability is a key requirement for texts, both on paper and online. In fact, a text that is not readable is a text that does not reach, in a more or less serious way, its communication goals. In this work, the author will refer to the latter concept to determine the degree of readability of the reading by using the SMOG Analyses for the text in English and the Gulpease Index for the translations in Italian.

In the following paragraphs, results from the language analyses of the English text on the Portus FutureLearn MOOC (web pages, transcripts and subtitles) and the parallel Italian translation will be illustrated.

2.5.1   SMOG Analysis as applied to the English text

The Simple Measure of Gobbledygook (SMOG) was created in 1969 by McLaughin with the aim to define a measure of readability that estimates the years of education needed to understand a piece of writing. It is used frequently in the development of health literacy documents and health related information (Lloyd, 2010; Monkman et al., 2020; Ojo et al., 2020). SMOG analyses were preferred to other readability tools (e.g. Flesch-Kincaid, not introduced with FutureLearn) as being more consistent in performance (Wang et al., 2013)

However, Beukes (et al., 2020) invites us not to generalise the results as the formula might ignore many factors that contribute to comprehension, and a simple application of shortening words and sentences might render materials inaccurate.

The formula below is based on American English and gives slightly different results if applied to the British context:

$$SMOG = 1.043 \sqrt{Number\ of\ polysillables\ + \frac{30}{number\ of\ sentences} + 3.1291}$$

For the purpose of this research, the author used the free online tool[103] provided by the University of Nottingham. The online tool was chosen as the SMOG formula has been calibrated to British English by replacing the number 3.1291 with 8.

The text created for the Portus MOOC has been divided into three categories: *Video, Article* and *Discussion*, following the distinctions already made in FutureLearn. The *Video* page is the more complex as it includes text, images and a video with transcript and subtitles. The page listed as *Article* is formed by text presenting a particular topic and pictures related to it. The *Discussion* has an introductory section formed by two to three sentences and a discussion topic area that MOOC students are asked to address in their comments. The analysis below has processed the text from the transcript as part of the *Video* category and the text in support of it as *Article.* Transcripts will then be used to compare the results in English and Italian.

The graph in Figure 27 shows the results applied to the MOOC. Text used in the web pages appeared more complex and difficult than the one used in the video and in the *Discussion.* All results located above the orange line define text suitable for A level students and above using the classification provided in Table 9. Despite the text being accessible to British students, it might not be easy to understand for Italians studying in a second language. The green line identifies the level at which the text is understandable by GCSE lowest grades. Ideally, all texts should score in between the two lines to be widely accessible.

It was noted that steps in the third and fifth week of the MOOC scored higher on the SMOG analyses. Results could have been influenced by the technical terms used and complexity of the topics covered, which included aerial photography, LIDAR, the paleoenvironment and photogrammetry. The text has since been rewritten, simplifying it while maintain the technical terminology. Examples are included in Appendix C.

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[103] http://www.learningandwork.org.uk/SMOG-calculator/smogcalc.php
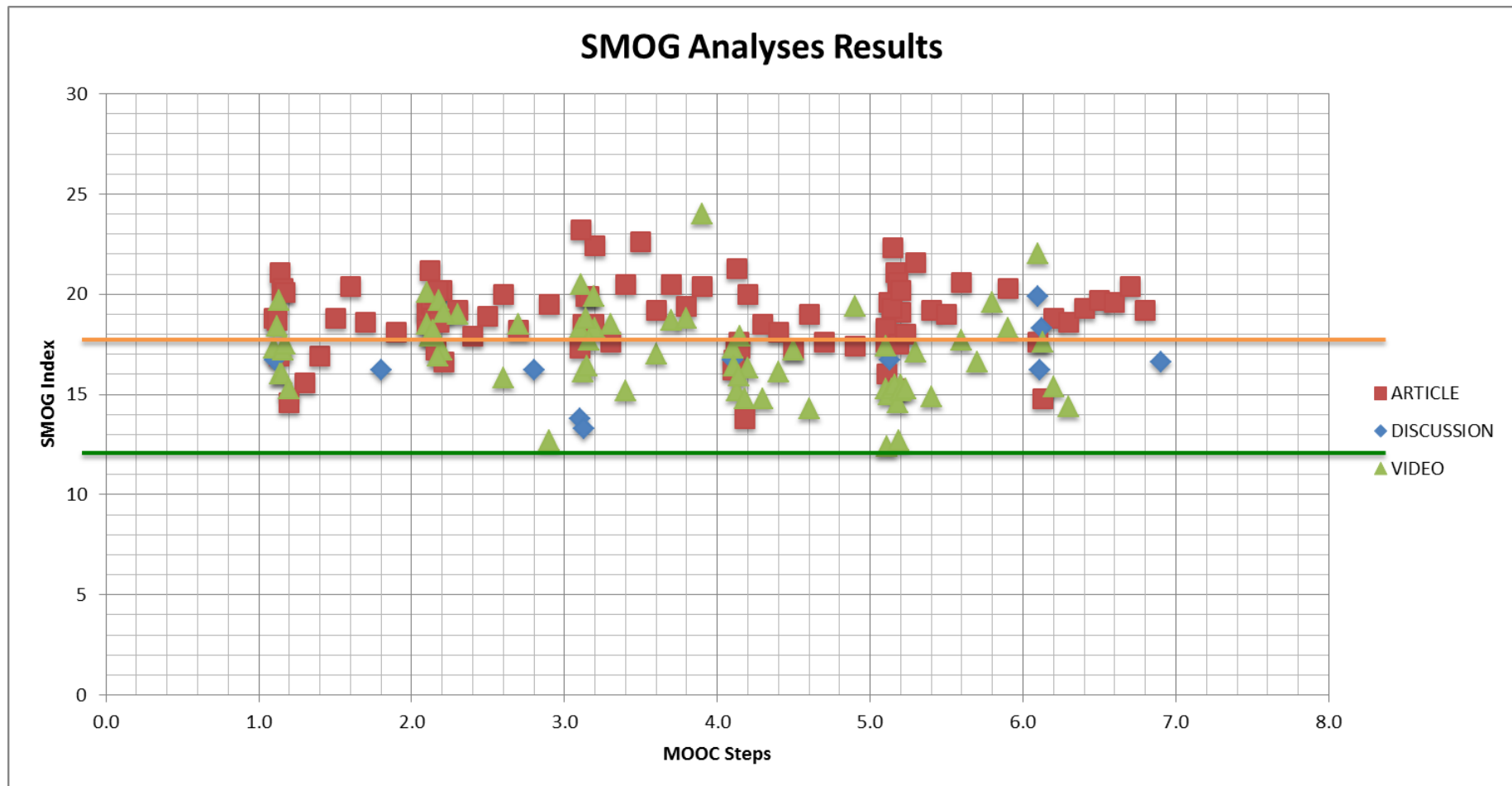
Figure 28 SMOG Analysis applied to the Portus MOOC resources. All results located above the orange line define text suitable for A level students and above, while the green line indicates text suitable for GCSC students, using the classification provided in Table 9.

Level QCF	NQF Age Equivalent	Literacy *An adult classified at this level understands:*	Examples of Typical Skills	Bloom's Taxonomy		SMOG Readability score
Entry 1	5-7 years	Short texts, repeated language, familiar topics, information from common signs and symbols.	Writes short messages. Selects floor numbers in lifts.	Knowledge gathering, comprehension relying on speaking and listening skills rather than reading and writing.		N/A
Entry 2	7-9 years	Short straightforward texts, familiar topics. Short documents, familiar sources, signs and symbols.	Describes health symptoms. Uses a cashpoint machine.			N/A
Entry 3	9-11 years	Short straightforward texts on familiar topics, information from everyday sources.	Understands price labels. Pays household bills.			10-11
Level 1	Matriculation examinations (GSCE) grade D-G	Understands short straightforward texts of <u>varying length</u> on a variety of topics, accurately and independently, from different sources.	GCSE grades	Knowledge gathering, comprehension		12-13
Level 2	GCSE grades A* to C or higher qualifications	Understands texts of varying complexity, accurately and independently, can obtain information of varying length and detail from different sources.	5 grades A* to C GCSE	Analysis, application		14 – 16
Above Level 2	A levels and above	Increasing ability to obtain, interpret, evaluate and synthesise complex information.	A levels and above	Evaluation, synthesis		17+

Table 9 This table shows the SMOG Index results associated to QCF, NQF and literacy skills. It was created by the NHS to develop best practice in health literacy in the UK (Rowland at al, 2013).

2.5.2   Gulpease Index as applied to the Italian text

The text in English (transcripts and subtitles) was translated following Taylor's 'rolling translation' methodology where he states that: 'a translation, particularly a literary translation, is not complete until all the linguistic, pragmatic and stylistic aspects have been properly understood and accounted for.' (Taylor, 1998: 118). In other words, the final text does not represent a literal translation but it is a modified version where contents have been adapted for the audience. As an example, where the English text was formed by a Latin word with the explanation of its meaning, the author has omitted the explanation if the word is of common use in Italian.

As opposed to the other index, the Gulpease Index is a readability test created specifically for the Italian language (Lucisano and Piemontese, 1988). It is different from other indexes as it utilises the length of the words in letters and not syllables, which makes the calculation simpler. The index was created by the *Gruppo Universitario Linguistico Pedagogico* (GULP) at the University La Sapienza (Rome) and it uses the data collected between 1986-1987 by academics working in the Philosophy of Language and Pedagogy at the Institute of Philosophy.

The index considers the length of each word and the length of each sentence in relation to the number of letters as linguistic variables using the following formula:

$$Gulpease\ index = 89 - \left(\frac{\frac{number\ of\ letters*100}{total\ number\ words}}{10} \right) + \left(\frac{number\ of\ sentences*100}{total\ number\ words} \right) * 3$$

Results are expressed with a value between 0 and 100, where the latter indicates a higher grade of readability and the former indicates difficult texts.

The following image (Figure 29) defines the level of readability based on Italian school levels.

Given its simplicity, the index can be used to analyse both short and long texts; in the latter case it is necessary to operate on a sample of the text. The Gulpease Index is the first index of calibrated readability in the Italian language and has the advantage of calculating the length of words in letters instead of syllables.

The degree of legibility gives an evaluation of a text in proportion to the complexity of its sentences. This parameter is inversely proportional to the average length of text sentences. This means that sentences with an average length that are too high will reduce

readability in proportion. If the average length of the sentences is too low, the text will be too elementary. In order to reach about 75% of the readers, the average length of the text sentences should be 16 words.
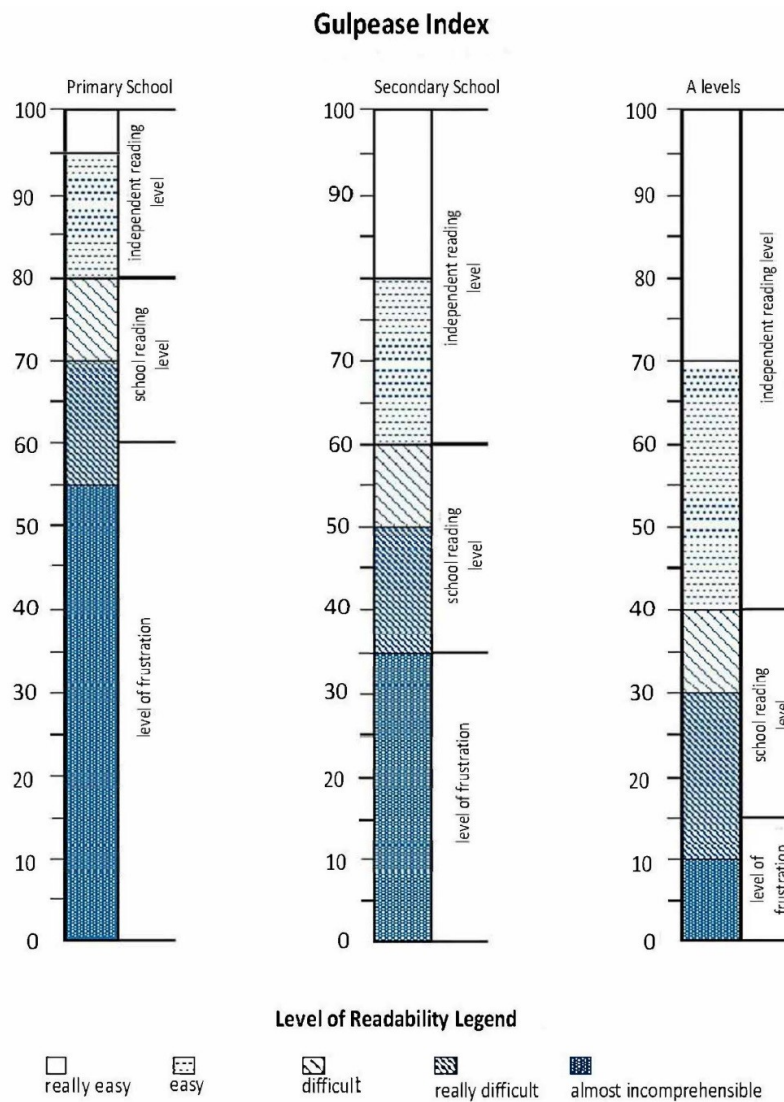
Figure 29 Gulpease Index values. The Image was created by Eurologos (Piemontese, 1996: 102) and identifies the level of readability associated to different school levels.

Complementing the Gulpease Index is the evaluation of the common vocabulary used in the text, namely the 'notoriety' of the individual terms used.

The text in Italian appears to be within 43 and 76 on the Gulpease Index (Figure 30), which make it accessible to A-level students as independent readers and to secondary school students as a more difficult school level reading.

All translation appears to be addressing the appropriate language level for the purpose of this research project (A-levels equivalent students). However, a further revision of the Italian text could explored to ensure all text provided scores above 60 and is suitable for a wider audience. Appendix C contains examples of the revised text in Italian.
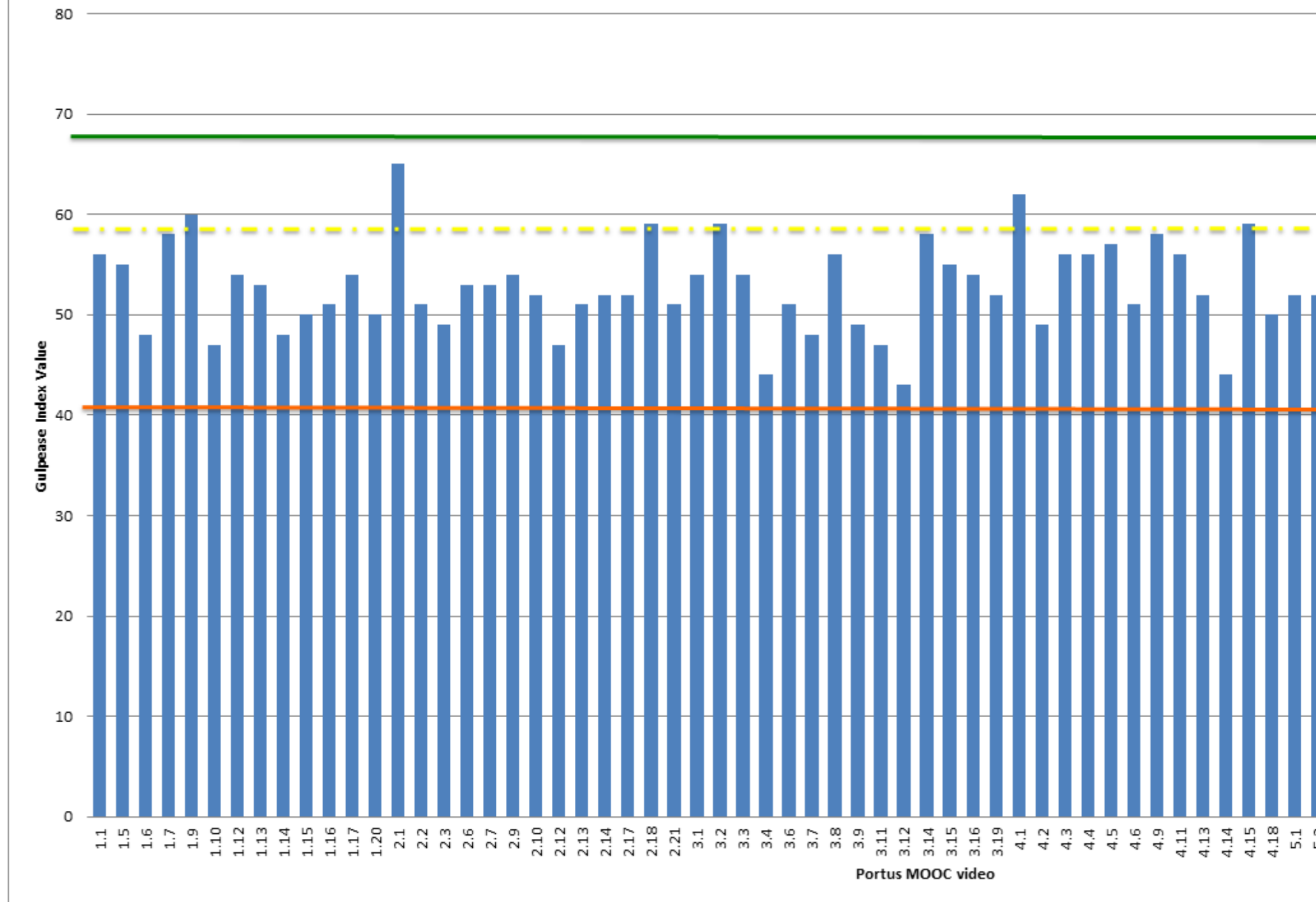
Figure 30 A graph representing the analyses of Italian translations using the Gulpease Index. The green and orange lines identify the range of values for text easily

2.6 Recommendations for Changes and the Addition of Making 16 to 18-year-olds a Target Audience

To improve the readability for the audience, their level of pre-existing knowledge needs to be taken into account. Some of the results of the SMOG analyses on the English text show high values as Italian and Latin words were used by Southampton staff. A list of definitions was created and made accessible as part of the MOOC to explain archaeological technical terms or to translate them into English. In addition, the subtitles in the videos contain the translation in English. The SMOG analyses index was also affected by subject specific words.

For the text in Italian, the basic vocabulary of the Italian language – a summary of the 7,000 Italian words most used and understood-, created by De Mauro (1980) was used for the translation of contents. The vocabulary brings together two categories together into a unitary set:

1. The most widely used vocabulary in the texts of a language at a given historical moment (over 4,000 words), which takes into account the so-called language dictionaries of the various languages.
2. The words (2,337 words) that, although in fact little used by talking or writing, are perceived and felt by those who use a language as having the same or even superior availability to the most widely used words.

The most used words are derived from the statistical analysis of texts or a sample of texts in Italian. The more pronounced words can only be obtained by a survey of living speakers at the time of the survey. To have a good degree of chronological homogeneity of the set, the entire basic vocabulary is based on texts and speaking judgments as much as possible over the same years.

By using the basic vocabulary in writing the translations in Italian, it increased the readability significantly. In fact, using common, familiar and simple terms is one of the most effective ways to increase readability.

For the English version, it is suggested to use numbers instead of words or use the extended name of the technology avoiding acronyms. Terminology in Latin and Italian should be used only if a glossary is provided and limited where possible. Sentences should be short and clear. Appendix B includes an example of text revisited to improve the SMOG score.

2.7 Methodology

The extension of the learning objectives to match the Italian and English education requirements, the analyses of the Archaeology or Portus MOOC's steps to identify complementary areas within the Italian education system, and the language analyses presented in the last two paragraphs are only the initial steps that led the selection of particular steps to be used in this research.

As anticipated in Chapter 1, a conversation with one of the learners has triggered a separate conversation on which steps could be used to integrate compulsory education in Italy. To simplify the extensive learning material created for the MOOC, I have worked closely with the teacher to co-design new pathways to ensure a meaningful relationship between the MOOC, the Italian teacher's needs and subsequent needs during the re-evaluation.

Five different thematic pathways (Table 10) have been used to re-organise the selected steps:

THEMATIC PATHWAYS	STEP TITLE
Buildings	Roman Buildings and Methods
	Grandi Magazzini di Settimio Severo
	What has the Excavation of the Imperial Palace Told us?
	Terme della Lanterna
	Basilica Portuense
	Building Five - a Possible Navalia
	Building Three
	The Amphitheatre
	The Castellum Aquae
Phases	The Great Basin of Claudius and the Portico di Claudio
	The Reason behind the Construction of Portus and its relationship to Ostia
	The Roman Empire in the Claudian period
	The Phases of Portus
	The Trajanic Ports
	The Roman Empire Under Trajan
	The Trajanic Expansion of Portus
	Portus and Rome
	Roman Empire in the Later Second Century
	Development of the Port
	Later Fifth to Seventh Century Use of the Port

THEMATIC PATHWAYS	STEP TITLE
Excavation/Discoveries	Excavation of the Imperial Palace
	Amphora Sherds from Leptis Magna
	Uncovering the Portus Head
	The Value of Ceramic
	Nails and Other Metal Artefacts
	Marble Cladding
	Brick Stamps from Ocriculum
	The Brick Stamp of Marcus Rutilius Lupus
	Bronze Constantinian Coin
	Fineware
Computer Graphics: Reconstructing Portus	Reconstructing Building Five
	Photogrammetry and Laser Scanning of Artefacts
Roman Trade Network	Links to Other Ports
	Globalisation
	The Types of Cargo that were Imported through Portus
	Marble and the Mediterranean

Table 10 This table illustrates the five thematic pathways with their related steps created in partnership with the school teacher involved in the first pilot (Chapter 5) as complementary to the school curriculum.

As well as providing access to literary and educational resources and expertise, this new pathway may also provide access to collections of statuary offering comparative examples to the subject being studied.

2.8 Concluding thoughts

In preparation for the first pilot which will be presented later, steps from the course have meticulously been mapped to the Italian curriculum to assess which content can be used in a variety of contexts while maintaining the original archaeological message. Subjects like geography, history of art, foreign languages and culture, history and Latin literature and culture present an opportunity for alignment with the Italian curriculum. Learning objectives mapping and in-depth analyses of the steps allowed me to define five thematic pathways that could best fit the current Italian system requirements and that will be explored further in the two pilots discussed in Chapters 5 and 6.

This chapter opens with a citation regarding the simplification of the language that is often associated with a loss of information instead of focusing on making information

accessible to a wider audience. The SMOG and Gulpease analyses illustrated have been applied precisely to determine the complexity of the text in English (McLaughin, 1969) and Italian (Lucisano and Piemontese, 1988) and to help identify recurrent patterns that might have influenced the score. However, it needs to be remembered that readability analyses give a quantitative evaluation of the text without considering the quality of the information provided. This means that despite classifying the text according to age groups and a quality framework, it does not indicate how comprehensible the text is or if it includes great scientific value. The use of technical terms might influence the readability scores, and this should be taken into account when analysing the results and adapting the text for a specific audience. Some recommendations for changes and suggestions have been articulated at the end of the chapter to maintain the balance between the quality and the accessibility of the content. This includes the creation of support literature and information like a glossary, a timeline, or footnotes to the text that could improve the assimilation of contents and would also help non-native speakers.

While the level of English of Italian language used might represent one of the first barriers to some, it is also important to consider how the learning materials produced for the MOOC could be integrated into pre-existing education structures to maximise engagement, making the content even more accessible. For this reason, all resources selected for the pilots have been aligned to the appropriate readability scores before being grouped into five different thematic pathways (buildings, phases, excavations/discoveries, computer graphics and Roman trade networks) which are offering a flexible and modular complementary option to the Italian curriculum.

Chapter 3   Education Structure in England and Italy

The previous chapters have briefly introduced some aspects of the English and Italian education systems that will now be explored in more detail (Figure 31). Differences and equivalences across both educational histories and structures will be described to better understand the context in which the pilots operated, while the figure below can be used as a visual guide throughout the chapter.

I will also explore the different ways in which archaeology is represented across both curricula to identify equivalencies before introducing opportunities offered by the recognition of achievements with traditional credit transfers and open badges. FutureLearn has introduced a series of certificates, issued by the HE institution leading the MOOC, that could contribute to sustained links between schools and Universities via the recognition of prior learning.
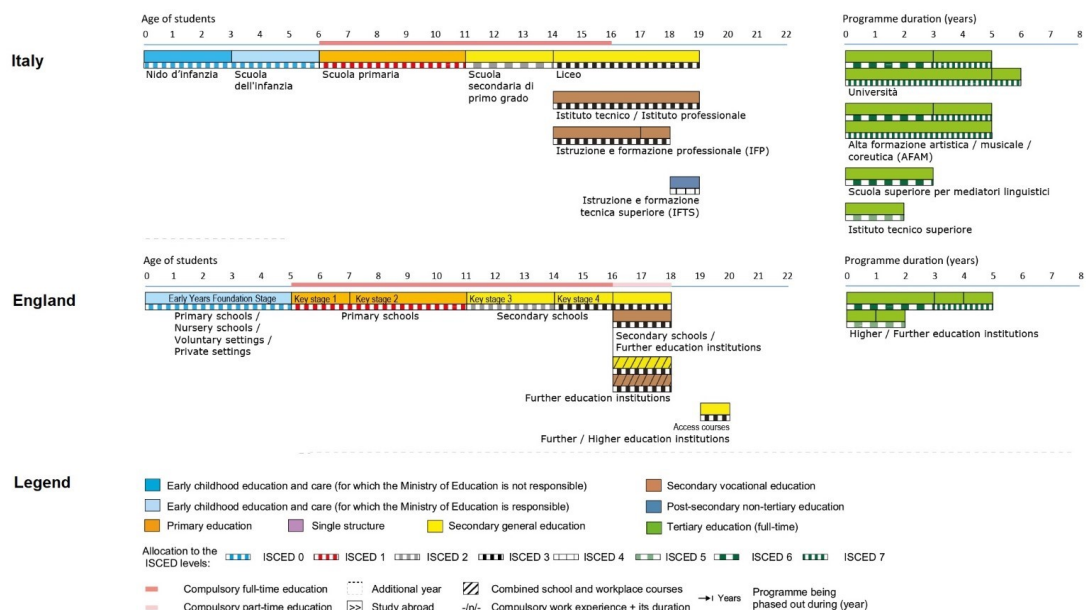
Figure 31 This diagram compares the English and Italian Education systems. Compulsory education in Italy starts a year later than in England, and their secondary general education ends one year later (Eurydice, 2019).

3.1 Education in England

3.1.1 A brief history of Education Reforms

Education in England is compulsory until the age of 18 for those born on or after 1st September 1997, and the medium of instruction is typically English. The English education system is very similar to those in Wales and Northern Ireland, which share a common framework, while the Scottish system has a different structure and offers distinct awards.

The Elementary Education Act 1870 provided for the establishment of locally elected school boards to raise funds for the provision of elementary schools in areas where voluntary provision was inadequate. Elementary school attendance was made compulsory in 1880 and, in 1890, became mostly free.

The Education Act 1902 established Local Education Authorities (LEAs), which assumed responsibility for both elementary and secondary education, including boarding schools and voluntary schools. It aimed to promote the expansion of secondary education and, although this was not free of charge, local authorities offered scholarships to pupils who passed an entrance examination.

A successive Education Act (1944) divided education into three levels: primary (five to eleven years of age), secondary (eleven to fifteen, later extended to sixteen years) and further education (which included what is currently known as higher education). While the 1944 Act also established a single legal framework embracing different categories of publicly funded schools and set out the roles of central and local governments in the provision of education. Although the Minister of Education had a broad duty to 'promote the education of the people', the Ministry was not responsible for providing schools, employing teachers, or prescribing curricula.

The legal framework for the school system remained substantially unaltered from the passing of the 1944 Education Act up to the beginning of the 1980s. The only addition was provided by the Education Act 1964, which allowed the creation of middle schools as a variation of existing schemes and funded Special Schools beyond compulsory school age.

Although there were relatively few structural changes during this period, there were many changes in terms of curriculum and teaching approaches, particularly from the early 1960s. The teaching profession and schools, particularly primary schools (freed

by the spread of comprehensive education from the constraints of exams at age 11) began to develop curriculum innovations and informal child-centred approaches to teaching. However, the level of autonomy enjoyed by individual schools varied, as LEAs had broad discretion in the constitution and operation of managing (primary) and governing (secondary) bodies.

The 1980s saw an increase in legislation governing the school system, causing an increase in the power of the central government and the school's independence. As a result, the role of local education authorities diminished. It also created individual school governing bodies to engage parents and teachers in the schools' management (Education Act 1980, 1981, 1986).

The Education Reform Act 1988 (ERA) provided for the introduction of the National Curriculum and the delegation of budgets to schools, and were the first to define the key stages of compulsory education. This change meant to standardise the teaching, assessment and examination across the country by providing guidelines to teachers. Skills to be assessed per subject and at each level were defined by working groups and were included in the National Curriculum (Graham and Tyler, 2000). The Act also allowed primary and secondary schools to opt out of the local authority (LA) control, although this change was subsequently reversed by the School Standards and Framework Act 1988. The ERA also and made necessary reforms to higher education, taking polytechnics and higher education colleges out of LA control.

The Further and Higher Education Act 1992 took further educational institutions out of local authority control, creating a single higher education sector. Since 1996, several significant pieces of education legislation have been introduced in England mainly looking at special needs and skill development (Learning and Skills Act 2000; Special Educational Needs and Disability Act 2001; Education Act 2002; Further Education and Training Act 2007; Education and Skills Act 2008; Apprenticeships, Skills, Children and Learning Act 2009).

Perhaps the most significant of all, new AS and A-levels have been taught in schools in England from September 2015. The reform was intended to make AS and A-level qualifications more challenging so that students could be better prepared for work or in higher education[104].

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[104] https://www.gov.uk/government/publications/2010-to-2015-government-policy-school-and-college-qualifications-and-curriculum/2010-to-2015-government-policy-school-and-college-qualifications-and-curriculum#appendix-4-gcse-reform (last access 29 August 2017)

3.1.2   Education structure and the National Curriculum

School education consists of primary (infant and junior) and secondary education. The division is sometimes into first (primary), middle and upper (high) schools. Education is compulsory between the ages of 5 and 16, though it became compulsory until the age of 18 in 2015.

After five years of secondary education, students take examinations in a range of subjects at the level of General Certificate of Secondary Education (GCSE). Each GCSE exam covers only one subject, and it is set and marked by independent examination boards. Each student usually takes about ten (there is no upper or lower limit) different GCSE examinations, including subjects like mathematics and English.

After taking GCSEs, students can either leave secondary schooling, or they may choose to continue to study following a further education pathway, or they may study an additional year before taking higher secondary school examinations known as AS-Levels. After an additional year of study, students may take A-Levels (short for Advanced Level) examinations, which are required for university entrance in the UK.

The National Curriculum refers to the Curriculum Framework, which is sets standards referred to as learning outcomes. Learning outcomes defines the content to be learned in terms of clear definable standards or what each student should know and be able to do at the end of each year or Key Stage. The curriculum is developed in alignment to those standards and students are assessed regularly against it. The Education Reform Act introduced it as a central feature in the primary and secondary schools of England and Wales in 1988. Despite the fact it is not required by independent schools, most of them have adopted it.

A variety of subjects are taught, in addition to the core skills of English, mathematics and science, over four Key Stages. The table below (Table 11) illustrates the requirements defined by the National Curriculum in 2013. Schools are now obliged to offer a minimum of one subject per entitlement area at Key Stage 4.

	KEY STAGE 1	KEY STAGE 2	KEY STAGE 3	KEY STAGE 4
Age	*5 - 7*	*7 - 11*	*11 - 14*	*14 - 16*
Year Group	*1 - 2*	*3 - 6*	*7 - 9*	*10 - 11*
English (core)	X	X	X	X
Mathematics (core)	X	X	X	X (since 2001)
Science (core)	X	X	X	X (since 2001)
Art and design	X	X	X	
Citizenship			X (since 2001)	X (since 2001)
Design and technology	X	X	X	
Geography	X	X	X	
History	X	X	X	
Information and communication technology	X	X	X	X
Modern foreign languages			X	
Music	X	X	X	
Physical education	X	X	X	X (since 2001)

ENTITLEMENT AREA	SUBJECT
Arts	Art and design, music, dance, drama, media arts
Design and technology	Design and technology
Humanities	Geography, history
Modern foreign language	Modern foreign languages

Table 11 This table indicates all requirements defined by the National Curriculum in
2013 for the core and entitlement areas.

Signs of the progress of each student are assessed (also known as SATs) in levels (from 1-8 with 1 being the lowest) at the end of each Key Stage, especially in the core subjects. Levels are established based on teachers' assessment at Key Stages 1 and 3 while a national test is undertaken at Key Stage 2. GCSE examinations close Key Stage 4, where students can still benefit from a flexible curriculum and can select additional subjects based on their interests and aptitudes. In 2014, a revised National Curriculum was introduced.

New AS and A-levels have been taught in school since September 2015 (Ofqual, 2017) as part of the most recent reform, and subjects like archaeology and history of art are now no longer offered. The latest changes aim to develop a curriculum that focuses on "the essential knowledge and skills every child should have" so that teachers "have the freedom to shape the curriculum to their pupils' needs" (BBC, 2014). With this change at Key Stage 4 (KS4), history is the only formal curriculum subject in England that delivers instances of archaeological education. However, this is not always made clear to the students.

3.1.3   Archaeology

Until 2004, archaeology was included as a subject at O level and GCSE level. However, this changed later as the subject did not have a high enrolment, and there was a lack of teachers that could comfortably teach the content (Henson, 2008). The curriculum was also influenced by recommendations submitted by the Council for British Archaeology (Council for British Archaeology, 1989) showing a direct link between skills required by the industry and education.

Barrett (2015) has explored how the National Curriculum, in its initial and most recent form, has allowed archaeologists to contribute to education in schools pre-GCSE (KS1 -3). The picture which is emerging is not surprising, and there is still a lively debate over the importance of archaeology as an independent subject or as a supplement of history. When associated with history, prehistory and roman periods are quite prominent alongside the focus on chronology and a much broader scope for studying non-European cultures. However, while most of the subjects have aligned the curriculum over time to meet labour skills demands, the content offered by history has remained static and has remained almost identical since the creation of the National Curriculum. The only notable changes, in addition to the most recent historical events, are related to the volume of the content students have to learn and the stage in which it is a required subject (Corbishley, 2011: 121).

Considering the KS4 (14 to 16 years) qualification in England, archaeology is mainly associated with classical studies or classical civilizations. Henson (2016) recognised that even though archaeology can be used within any subject, it is mainly associated with history and to a lesser extent with geography and science. As the Curriculum is decided at the national level, each country stresses some specific historic periods. England, for example, emphasises the history of the Greeks, Romans and ancient Egypt more while Scotland, Wales and Northern Island focused more on identities and periods that have shaped the local territory.

I strongly agree with Henson (2016) that archaeologists should change their mindset and instead of expecting teachers to fit archaeology in the National Curriculum, we should analyse how archaeology can offer emerging themes which match not only the historical curriculum but also philosophy and other scientific subjects (e.g. chemistry, biology). This research follows this way of thinking by distilling content already created and showing how could the content can be repackaged to fit a pre-existing structure. Henson divides archaeological content into different aspects that could be used by teachers in the areas of technology, economics, Society, Arts and Religion. Looking at the Roman period, he suggests that road building, trade, military/civilian relations, classical realism and religious practices could be made to fit the curriculum. The scope of this background section is to map equivalences between the English and Italian education system validating the assumptions introduced in Chapter 1, paragraph 3.

3.2 Education in Italy

3.2.1   A brief history of education reforms

The *Ministero dell'Istruzione, dell' Università e della Ricerca*[105] (MIUR), previously known as the *Ministero della Pubblica Istruzione*[106] (MPI), is responsible for the Italian formal education system. MIUR organises and coordinates educational activities in public and private institutions. Vocational education, outside professional secondary schools (under the MIUR), is mainly the responsibility of individual regions. The school leaving age was raised to 16 in 2007, meaning that ten years of education are compulsory (Law 296/2006, art. 1 comma 622; Decreto Ministeriale 139/2007 art.1; Circolare Ministeriale 101/2010).

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[105] Ministry of Education, Universities and Research
[106] Ministry of Public Education

The medium of instruction at all levels is Italian, except for the autonomous regions of Valle d'Aosta/Vallee d'Aoste and Trentino-Alto Adige/Südtirol where French and German are also used, and bilingualism is widespread (Italian Constitution, 1948, art. 6).

However, it was only in 1999 (Law n. 482/99) that the languages of minorities (Figure 32) were formally recognised, as important and frequently used, and officially accepted as languages of the education system (at all levels, including higher education) and as a means of public communication. The approval of Law no. 482 of 15 December, 1999, represents an important event in the history of the country because it tends to enhance the unity of Italy through the plurality of its linguistic and cultural expressions, in the sense of not only decentralising administration but also substantial government management (Morelli, 2006).
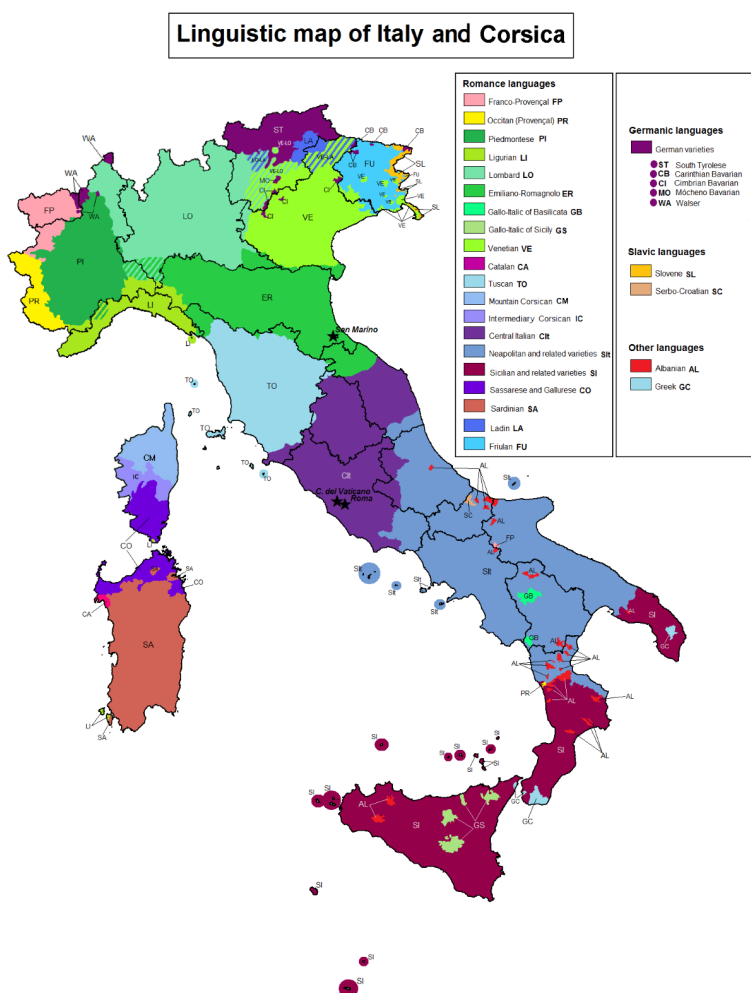
Figure 32 This map created by Di Mikima (2016) illustrates the different languages spoken across Italy. CC BY-SA 4.0,
https://commons.wikimedia.org/w/index.php?curid=47107644

This piece of legislation also proves, once again, how the Italian education system has been vastly influenced by Italian history. It is important to remember that Italy as we know it was formed in 1861 with the creation of the Kingdom of Italy[107]. Before the unification, the Casati Act (Law 3275/59) laid down the provisions for the organisation of state education. The main characteristics of the system were its centralised administration and a clear-cut division of upper secondary education between classical schools (involving the study of Latin and opening up the way to university education) and utilitarian schools (with no Latin courses and providing only the education needed for practical jobs). Barbieri (2010) notes that this Act delegates preschool to private institutions and maintains a rigid segregation between the non-compulsory curriculum for working class pupils and the longer one for the middle-class pupils.

In 1888, the structure of formal pedagogy was reviewed and adapted to more practical and experimental structures, and compulsory education was reorganised for children up to 12 years old. Other changes included the introduction of support for disadvantaged families (Law 407/04) and centralised state-level equal payments to teachers (Law 487/11). The positive effect all reforms caused were limited, even if the rate of literacy increased and the intellectual unemployment phenomena appeared in Italy for the first time.

Table 12 shows the level of illiteracy from the unification of Italy to the '90s and compares it to other European countries (Genovesi, 2010). Italy had an average of 74,7% illiteracy with a 91% peak in Sardinia and 90% in Calabria and Sicily, balanced by 57% in Piedmont and 60% In Lombardy. In the same period, the rate of illiteracy in Europe was 10% in Sweden, 75% in Spain and 34% in England. A 1911 governmental illiteracy study in Italy showed that the increase in the population allowed, in proportion, more illiterate people to vote, with the increased risk of influencing political elections in the country: "*It is, in fact, in a few colleges in Italy, corruption, violence, and fraud have already taken that extension to falsify the will of the voters.*" (Camera dei Deputati, 191: 337).

At the end of the First World War, on the eve of fascism, Italy was still primarily an agricultural country, with a high percentage of people who were functionally illiterate (over 35%), when compared with the situation of other countries.

Year	Italy	Spain	Germany/Austria	Switzerland	Sweden/Norway/Denmark	England
1861	74,7	75	20	19	10	31
1880	47.5	55	2	2	1	14
1900	48.6	51	1	1	0.5	3
1920	35.2	49	1	1	0.5	3
1941	13.8	17	1	1	0.5	2
1950	12.9	16	1	1	0.5	2
1960	8.3	12	1	1	0.5	1
1970	5.2	5.9	1	0.5	0.5	0.5
1980	3.1	3.4	0.5	0.3	0.5	0.4
1990	2.9	2.8	0.2	0.2	0.3	0.3

Table 12 The table shows the level of illiteracy in certain European countries from 1861, the year of the creation of the Italian Kingdom (data from Genovesi, 2010). From 1951, the data did not represent people that could not write their name, but only who were unable to read and write. The data shows the high level of illiteracy in the Italian peninsula, and the work put in place by the government to increase literacy.

Italian life and culture between the two world wars of the twentieth century suffered heavy conditioning of the rule of fascism. To increase literacy, Giovanni Gentile, Minister of Public Education, led the "Gentile's reform" (royal legislative decrees of 31 December, 1922, n. 1679, 16 July, 1923, n. 1753, 6 May, 1923, n. 1054, 30 September, 1923, n. 2102 and 1 October, 1923, n. 2185), which was then defined by Mussolini as the "most fascist reform approved". Italian was the only language of teaching, and the primary school programme valued signing, drawings and local traditions. There was a relative enhancement of Italian dialects, but a clear limitation to the linguistic minorities (especially to those of the new Slavic and German-speaking provinces) in favour of the deepening of a unified national, linguistically sensitive and consistent, but experimental and open, articulated and accessible country. The

structure of the Italian school system remains substantially guided by the 1923 model even after the end of fascism, and elementary school programs remain unchanged to this day with the exclusion of some attempt to change Italian grammar and math programmes (for example by inserting a set theory).

The new government established after WW2 inaugurated the _Consiglio Superiore della Pubblica Istruzione_[108], an executive arm with competences for primary school and university, without impacting the structure or curriculum.

In 1958, a pilot project called Telescuola was created to facilitate the completion of compulsory education to children residing in areas with no secondary schools. The show, watched by over four million people, was also promoting art and history in secondary schools. On the success of Telescuola, the Ministry of Education supported a television programme broadcasted by RAI (_Radiotelevisione Italiana_) called "_Non è mai troppo tardi. Corso di istruzione popolare per il recupero dell'adulto analfabeta_" ("It is never too late. Education course to recover illiterate adults"). The TV programme, conducted by the teacher and pedagogue Alberto Manzi, aimed to teach reading and writing to illiterate Italians who were passed school age. It was formed by a series of authentic lessons, taught using modern teaching techniques, to classes consisting of illiterate adults via the medium of the TV. Nowadays we might call it a "MOOC", as movies, audio, practical demonstrations, as well as the hand of the master steers, with quick strokes of charcoal, drew sketches on a blackboard, and large sheets were used.

"It is never too late" played an important social and educational role, contributing to the cultural unification of the nation through the teaching of the Italian language and thus reducing the rate of illiteracy. It seems that thanks to these lessons at a distance, almost a million and a half people have managed to achieve a primary school education, even if Aldo Grasso (2014) would reduce this number to 35,000.

In 1970, pushed by student movements, there was an opening to university courses, that were accessible only from classical studies, and the definition of the A-levels equivalent exams (two written tests, one in Italian and one specific to the course of study, plus a viva on two different subjects selected between the four suggested by the ministry) that remained in place for the following 30 years.

Despite the lack of primary legislation approved in this period, changes have happened informally, modifying the function of the school in the community to fight illiteracy and

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[108] Council for Public Education

truancy. The *diritto/dovere*[109] to education and training up to 18 years of age was introduced by Law 53/2003, and the compulsory study age was increased to 16 only in 2007 (Financial Law 2007), in a period marked by reforms that do not derive much from a political impetus, as from a sort of self-government of professional cultures, of which even academic pedagogy is primarily an expression.

In the second half of the 1990s, Prime Minister Enrico Berlinguer worked on a document outlining his principles of action. One of the key concepts was that of "new professionalism" as the ability to "control and direction of processes in which everyone is included", a concept derived from the trade union culture of the seventies. Moreover, the articulation of schooling for learning objectives instead of orders and degrees of education support a substantial continuity of instruction cycles. Berlinguer's plan saw a primary cycle of six years in duration aiming to "*contribute to the formation of man and citizen in respecting and valuing individual differences, social and cultural rights*". The following six years meant to consolidate and reorganise the skills and competencies acquired at primary level, to enrich the cultural, human and civil students, supporting them in the gradual assumption of responsibility, and to provide them with adequate knowledge and skills to access to higher education and university or the labour market (Law n. 30, 10 Feb 2000).

It was only with the start of the new millennium that Italy has started to see structural reforms but no changes in the curriculum. Moratti's reform (28 Mar 2003, n.53) changed the structure of the school system anticipating the start of primary school at 5 years and 4 months old (in line with the English system) and introduced the study of the English language beginning in year 1 (before students started to study a second language at year 7). With the change of parliament and a majority as a result of the 2006 election, the implementation of the reform was suspended. Furthermore, in 2007, the same Government had extended the length of compulsory education up to 10 years, corresponding to 16 years of age of the pupils (Law 296/2006;Decreto Ministeriale 139/2007).

In April 2008, a new parliamentary majority had taken place, and a new government settled in, as a result of a further general election. The government introduced some changes to the education system, starting with a reduction in expenditure (Law 133/2008) followed by urgent measures in education (Law 169/2008, known also as Gelmini's Reform). Some of these changes impacted the reorganisation of the second

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[109] The law recognises the *diritto* (right) to education for all students, but it also states that it is a *dovere* (duty) of each student to go to school and develop themselves until they are 16.

cycle of education since the school year 2010/2011. Initial teacher training was identified as a primary need, and the possibility to enrol children aged less than 3 and 6 to pre-primary and primary schools respectively were introduced.

Despite all the reforms and the long years in education[110] (OECD, 2002), only 20% of the Italian adult population possess the minimum necessary tools for reading, writing and computing needed to orient themselves in contemporary society (De Mauro, 2008)[111]. A more recent survey confirms the high rate of illiteracy and numerical illiteracy in the country in comparison to other European and international countries[112] (OECD, 2013).

To address all the issues above, Renzi's government introduced a new reform of the school (Law n. 107, 13 July 2015) known as "*La Buona Scuola*"[113]. This new legislation introduces a marking system for teachers and gives more autonomy to the head of school, the opportunity for students to partially customise their curriculum and includes work placements or similar activities even for non-technical institutes.

The law identifies five main themes:

1. *The school system gets up-to-date: training & innovation*
   This new law introduces mandatory professional development schemes based on peer collaboration. This is a pivotal point to foster a new generation of educators, in search of the Don Milani, Maria Montessori and Loris Malaguzzi of the 21st century.

2. *Digital schools*
   Matching fund schemes have been developed to ensure all schools have access to high-speed internet and Wi-Fi. This theme aims to co-design refreshed digital services for the schools to enhance transparency and reduce costs.

3. *Cultura in corpore sano*

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[110] In 2002, Italy was the third highest among 30 countries for the average number of years of schooling of the population aged between 25-64 years, after only in Portugal and Mexico (OECD, 2002) in Saverio Avveduto: http://www.parlandosparlando.com/pdf/ricerche/UNLA-rapporto_La_croce_del_Sud.pdf

[111] Tullio de Mauro, Internazionale 734, 6 marzo 2008. http://www.internazionale.it/firme/articolo.php?id=18612 (Last accessed 01/09/2018)

[112] http://www.oecd.org/skills/piaac/Country%20note%20-%20Italy%20(ITA).pdf

[113] The Good School

This area would like to emphasise the very best of being Italian. More music and sports are included in primary schools, while art and history hours are increased in secondary schools.

4. *New literacy*

The legislation aims to develop a stronger curriculum for foreign languages in primary schools. Digital skills are also playing an important role, with coding and development of computational thinking introduced at primary schools and the Digital Makers Plan at secondary school. Economic principles will also be taught in all secondary schools.

5. *School-at-work*

This new legislation introduces mandatory vocational training during the last three years of technical and professional curricula, for at least 200 hours per year. It aims to extend pilots of didactic enterprise and strengthen experimental training experiences.

3.2.2   Education Structure and national curriculum

Following reforms in 2003, which were then implemented in 2004, the education structure has been reformed from primary (*Scuola elementare*), lower (*Scuola media*) and upper (*Liceo*) secondary.

The new structure is as follows:

	Type of school	Length	Student age
Primo ciclo	*Scuola primaria* (primary school)	five years	ages 6-11
	Scuola secondaria di primo grado (first grade of secondary school) (previously *Scuola media/middle school*)	three years	ages 11-14
Secondo ciclo	*Sistema dei licei e sistema di istruzione e formazione professionale* (grammar school and vocational education system)	two to three or five years	ages 15-16/17/18

At present, education is compulsory for ten years (up to 16 years of age). It includes the first cycle of education (five years of primary school followed by three years of lower secondary school) and the first two years of the second cycle of education. The last two years of compulsory education can be accomplished either in upper secondary schools (licei, technical institutes and vocational institutes) or within the three-year vocational training courses run by the Regions (Law 133/2008). The length of

compulsory education has been extended up to 10 years by the financial law of 2007 and implemented by the Ministerial Decree 139/2007.

Reforms (*Gelmini* reforms) started in 2008 and entered into force in the 2010/2011 academic year, which made upper secondary education available through the following types of institutions: *licei* (subject-specific secondary schools), technical schools, vocational schools, and vocational and training courses managed by the regions and offered by accredited institutions.

This research focuses on the *licei (lycee),* which are divided into *classico* (classical secondary school), *scientifico* (scientific secondary school)*, linguistico* (language secondary school)*, delle scienze umane* (human sciences secondary school)*, musicale e coreutico* (music and dance school)*, and conservatori di musica* (music conservatories)

The curriculum consists of a variety of general subjects common to all the schools (geography, history, Italian, mathematics, and one foreign language) but with the majority of study time dedicated to the area of specialisation (such as music, chemistry, biology, additional foreign languages and Latin).

The Ministry sets the general curriculum requirement, and the school applies it to the local context to ensure the inclusion of diversity and engagement with the local environment. The articulation of the ministerial indication for subjects of study highlights how each discipline —with its content, its heuristic procedures, its language —contributes to the integration of a path of knowledge and skills acquisition. The epistemic statutes of the individual disciplinary domains and the identification of general transferrable cross-skills guarantee consistency and coherence across the subjects[114].

Metacognitive skills (learning to learn), relational (knowing how to work in groups) or aptitude (autonomy and creativity) are included in the process, as an indirect outcome depending on the quality of the process itself in each school. This was recently supported by the certification sheet (Decreto Ministeriale n. 9, 27 January 2010), which asks to assess the level reached by each student in some necessary skills articulated according to four cultural axes:

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[114] The Recommendation of the European Parliament and the Council of 23 April 2008 on the establishment of the European Framework for Qualifications for Lifelong Learning defines competence as the "proven ability to use personal, social and/or methodological knowledge, skills and skills, in work or study situations and in professional and personal development".

1. Learn to learn;
2. Design;
3. Communicate;
4. Collaborate and participate;
5. Act independently and responsibly;
6. Problem-solving;
7. Find links and relationships;
8. Acquire and interpret information

The acquisition of digital skills is a theme developed in the first two years of each path within mathematics. However, at the same time, it is the result of work "on the ground" in all disciplines. The use of digital skills, in fact, is instrumental in improving work in the classroom and supporting students' study, research, recovery and personal insights. It then appears important the contribution of technologies in education to develop such skills.

The acquisition of citizenship skills invests the school path in at least three levels. First of all, in the context of history and philosophy, the student is called on to learn some fundamental areas related to the intertwining of the two disciplines and the law. This occurs even in the paths that involve the teaching of law and economics. Secondly, life itself in the school environment is, under current law[115], a privileged area for exercising citizenship rights and duties. Thirdly, it is the schools' autonomy, in the richness of their educational activities, which adopts the strategies most appropriate to achieving the objectives set out by the ministerial indications[116].

The general indications provided by the Minister are anchored to the following criteria:

1) The explicitness of the fundamental and the essential contents. The legislation identifies shared cultural heritage, the common foundation of the knowledge that the school has the task of transmitting it to the new generations. In this way,

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[115] Article 7 Paragraph 1 of the Regulation Scheme on "Coordination of existing rules for the assessment of pupils and further application methods in this area, In accordance with Articles 2 and 3 of the Decree Act 1 September 2008, No 137, converted with amendments by law 30 October 2008, No. 169." indicates that personal freedom is achieved in the fulfilment of one's duties, in the knowledge and exercise of one's rights, in respect of the rights of others and the rules that govern civil coexistence in general and school life in particular. These rules are based on the principles of the Decree of the President of the Republic 24 June 1998, No. 249 and subsequent amendments (Namely Decree 249/1998), the Statute of Secondary School Students and Students, Articles 1 (Life of the School Community), 2 (Rights), 3 (Duties) and Art. 5-bis (Educational Co-responsibility pact) is a useful reference to the purpose not only of the exercise of citizenship within the educational institutions, but of the maturity of the student.
[116] This was established by the document for the testing of the teaching of Citizenship, issued by the Minister of Education, University and Research, Mariastella Gelmini, on March 4, 2009.

students can master and reinterpret in the light of the ever-new challenges launched, while teachers and institutes maintain wide margins of integration, autonomy and freedom to design innovative and quality school courses, without impositions of methods.

2) <u>The claim of a unitary knowledge</u>, without any separation between "notion" and its translation into skills, and the consequent renunciation of all taxonomy. The act of learning is not a mechanical process, it involves the discovery of something following the process of *seeing, applying, experimenting,* and *verifyin*g, to understand.

3) <u>The emphasis on the need to build, through dialogue between different disciplines, a coherent and unified profile of cultural processes</u>. The guidelines highlight the fundamental points of convergence, while disciplinary departments and school councils are left to design the intersection between subjects. These are usually identified in historical moments and nodes needing the views of multiple disciplines to be understood in their true scope.

4) <u>Language competence</u> in the use of Italian as a shared responsibility and cross-cutting goal common to all disciplines, without exclusion. The mastery of subject-specific lexis, the understanding of texts at the increasing level of complexity, the ability to express and argue in the correct form and with effectiveness are in fact skills proposed as the goal for all subjects.

5) <u>The possibility of being periodically reviewed</u> and adapted, in the light of the monitoring and evaluations, carried out as prescribed by Article 12 of the Secondary School Regulations[117].

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[117] See the regulation scheme bearing "Revision of the ordinance, organisational and educational structure of secondary schools under Article 64, paragraph 4, of the Decree Act 25 June 2008, No. 112, converted by law 6 August 2008, N. 133", "Article 12 (Monitoring and System assessment)". It identifies: 1. Secondary school pathways are constantly monitored and evaluated. To this end, the Minister of Education, Universities and Research can use the technical assistance of the National Agency for the Development of School Autonomy (ANSAS) and the National Institute for The Assessment of the Educational System of Education and (INVALSI). 2. The educational, cultural and professional profile of the student at the conclusion of the second cycle of the education and training system for the high school system as well as the Indications in Article 13, paragraph 10, letter a) are updated periodically in relation to emerging cultural developments as well as the needs expressed by universities, institutions of high artistic, musical and choreographic education and the world of work and professions. 3. The students' achievement of the specific learning objectives under the National Guidelines in Article 13, paragraph 10, letter a) is subject to periodic evaluation by the National Institute for the Assessment of the Education and Training System (INVALSI). The Institute itself is responsible for publishing the results of the evaluation. The Minister for Education, Universities and Research presents a report to parliament every three years focusing on the results of monitoring and evaluation.

3.2.3 Archaeology

Although archaeology is not represented in the Italian educational provision as a separate subject like it was in England before the A-levels reform, art.2 (paragraph 2) of the regulation[118] states that secondary school education "should provide the student with the cultural and methodological tools for a thorough understanding of reality, so that he may be able to put himself, rationally, creatively, and critically, in the face of different situations and phenomena. Moreover, secondary school education should allow the student to acquire knowledge and skills both appropriate to the continuation of higher education, inclusion in social life and the world of work, and consistent with personal skills and choices".

To achieve these results requires the competition and the full enhancement of all aspects of schooling:

- The study of disciplines from a systematic, historical and critical perspective;
- The practice of the methods of investigation is specific to the different disciplines;
- The exercise of reading, analysis, translation of literary, philosophical, historical, scientific, non-fiction text and interpretation of works of art;
- The constant use of the laboratory for the teaching of scientific disciplines;
- The practice of argumentation and confrontation;
- The use of a correct, relevant, effective and personal written and oral exhibition mode;
- The use of multimedia tools to support study and research.

It is a guide, aimed at fixing some fundamental and essential points that only teaching practice can integrate and develop. The design of educational institutions, through the comparison between the members of the educating community, the territory, the formal and informal networks (which finds its natural outlet in the educational offer); the teacher's freedom and ability to adopt appropriate methodologies for classes and individual students are decisive for educational success. In this sense, archaeology complements all the other disciplines without the need for it to be represented separately.

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[118] See Revision of the ordinance, organisational and educational structure of secondary schools under Article 64, paragraph 4, of the Decree Act 25 June 2008, No. 112, converted by law 6 August 2008, N. 133

3.3 Quality Framework in England and Italy

The European Qualifications Framework (EQF) is seen as a point of reference for indicating the level of learning outcomes related to nationally recognised education and training pathways. It was developed in response to requests from the Member States of the European Union, the social partners and other stakeholders for a standard reference tool to increase the transparency of qualifications. The principal aims of the EQF are to promote citizens' mobility between countries and to facilitate their lifelong learning. It is a framework of eight reference levels described in terms of learning outcomes. As an instrument for the promotion of lifelong learning, the EQF is intended to encompass all levels of qualifications acquired in general, vocational as well as academic education and training. It was formally adopted by the European Parliament and Council on 23 April 2008, following a development and consultation process that began in 2004. The table below (Table 13) shows equivalences between the English and the Italian system.

European Qualification Framework (EQF)	ENGLAND		ITALY
	Qualification and Credit Framework (QCF)	National Qualifications Framework (NQF)	Quadro dei Titoli Italiani (QTI)
8	8	PhD/DPhil Professional Doctorates	Dottorato
7	7	Masters Primary qualification in Medicine, dentistry and veterinary science PGCE PGDip PGCert	Masters
6	6	Bachelor's degree Graduate Certificate Graduate Diploma	Laurea Triennale
5	5	Diplomas of higher education and further education Foundation degrees, Higher national diplomas	Diploma Tecnico superiore
	4	Certificates of higher education Higher national certificates	
4	3	A Levels	Diploma Liceo o Istruzione professionale
3	2	GCSE Grades A-C	Qualifica di operatore professionale
2	1	GCSE Grades D-G	Certification to prove knowledge at the end of compulsory education (16 years old)
1	Entry-level 3	Key Stage 3	Licenza media
	Entry-level 2	Key Stage 2	
	Entry-level 1	Key Stage 1	

Table 13 The table above indicates equivalences between English (QCF) and Italian (QTI) systems using the European Qualification Framework as a benchmark.

3.3.1 In England

The Qualifications and Credit Framework (QCF), the National Qualifications Framework (NQF) and the Framework for Higher Education Qualifications for England, Wales and Northern Ireland (FHEQ) are used to accommodate the majority of qualifications in use in the various sectors of education, training and lifelong learning in the UK.

The Qualifications and Credit Framework was formally introduced in 2008 (European Parliament and European Council, 2008). As it formed a significant strand of the UK Vocational Qualifications Reform Programme, the initial focus of QCF has been on vocational and related qualifications. However, it has been developed to include all qualifications in England, Wales and Northern Ireland other than higher education qualifications (covered by the Framework for Higher Education Qualifications).

It is designed as an inclusive and flexible regulated framework of units and qualifications that are capable of recognising the broadest possible range of quality assured learner achievements. The framework comprises eight levels and an entry-level that is further sub-divided into three sub-levels. It introduces a standard currency for achievement in the form of a framework of levels based on learning outcomes, as well as a system of credit.

The QCF, therefore, as well as being the national framework for qualifications (other than higher education qualifications) in England and Northern Ireland, has a broader application as a unit-based credit framework.

The National Qualifications Framework has been until recently been the framework for general and vocational qualifications in England, Northern Ireland and Wales. Since 2010, all vocational qualifications have been accredited to the QCF, and by that point, the QCF will have replaced the NQF for vocational qualifications. General educational qualifications[119] will continue to be located in the NQF until a decision is made whether or not to move them into the QCF. The NQF uses the same system of levels (Entry 1-3 and Levels 1-8) as the QCF.

The Framework for Higher Education Qualifications is a five-level framework for higher education qualifications and is based on the concept that qualifications are awarded for the demonstrated achievement of learning outcomes. The five levels of the FHEQ,

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[119] Principally the General Certificate of Secondary Education (GCSE) and the General Certificate of Education at Advanced Level (A-Levels).

designated 4-8, are differentiated by a series of generic qualification descriptors that summarise the knowledge, understanding and the types of abilities that holders of qualifications at each level are likely to have. The FHEQ has been verified as compatible with the Framework for Qualifications of the European Higher Education Area (the 'Bologna Framework').

3.3.2   In Italy

Despite Italy not having a National Qualification Framework at the time of this study, I have used the existing ongoing work to reference public national formal qualifications directly to the eight European levels.

The first Italian referencing report was adopted in December 2012 and presented to the European Qualification Framework advisory group in May 2013 (Italian technical working group, 2012). The report focuses on describing levels and subsystems of formal education and training, along with the formal qualifications awarded throughout, and those awarded by regions in the framework of the State-regions agreement, and on their reference to the European Framework.

The Italian qualifications framework for education, also known as Quadro dei Titoli Italiano (QTI), was published in 2010 by the Ministry of Education, University and Research. Self-certification of the qualification's framework for the European higher education area (QF-EHEA) was completed in 2012. Moreover, decisions made for higher education qualifications were aligned to the European document. The QTI also includes the pre-Bologna agreement qualifications and regulated professions. The work to create a National Quality Framework similar to the English framework was mandated to the EQF national coordination point that created a proposal for a comprehensive national qualifications framework. A decree for the establishment of an NQF started in 2015 and was finally adopted in January, 2018. Similarly to other European frameworks, the Italian one is divided into eight levels where knowledge, skills, autonomy and responsibility are its level descriptors. Given the fragmented education and training system where national and regional authorities are involved in designing and awarding qualification, the NQF offers an opportunity for local-national collaboration.

3.4 Recognition

Having introduced the education systems and learning objectives, I am now focusing on the recognition of the skills acquired during the learning process, which was introduced in the first chapter (see Chapter 1.6.2) in association with heritage MOOCs.

Traditionally, education and individual skills have been accredited by educational institutions with degrees, diplomas and certificates containing information on the learning objectives reached but giving less information about additional abilities that could match the work environment. Nowadays, many employers and universities are giving importance to a range of extra-curricular activities and interests in addition to more formal certificates and diplomas. This is because traditional education systems are not fully representative of the individual skills required by the labour market and leave gaps in the practical areas of competence of individuals, making it challenging to compare cultural and national contexts (OECD, 2017: 57; Lodwenwden et al., 2009: 17). To fill this gap, a shared information exchange, (micro) credential-describing skills that act as a standard is needed (examples from the European context are presented in Chapter 3.4.2).

In 2011, Mozilla created an 'open standard' or badge to ensure that skills could be certified and verified by anyone; information could be shared, and learners could create their development pathway (Surman, 2011: Mozilla Foundation et al., 2012). Therefore, a badge represents a set of skills or a goal achieved by an individual. It can be verifiable and as such, and represents a trusted relationship with a specific domain of skills (Mozilla, 2014).

From a technical point of view, it is a picture that includes data (Mathers, 2016). It has the advantage of being transportable, unconnected to the supplier, and owned by the one who earned it. Of all the information, there is one, the 'evidence', which makes the badge not a mere digital version of a traditional certificate, but potentially a new way of certifying skills. Employers and educational institutions can, therefore, check online who issued the badge and what a student had to do to obtain it (Gauthier, 2020; Clements et al., 2020). This increases the trustworthiness of the badge. As an example, developers are required to show their activity to Github[120], where the employer can verify the real ability of a programmer by looking at the platform

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[120] GitHub is a Git repository hosting service, but it adds many of its own features. While Git is a command line tool, GitHub provides a Web-based graphical interface. It also provides access control and several collaboration features, such as a wikis and basic task management tools for every project.

interactions (Marlow et al., 2013; Terdiman, 2011). A badge could represent these interactions. Open badges can be rewarded automatically to whoever performs online activities and meets the pre-defined standards (Shahri et al., 2020; Stefaniak and Carey, 2019; Mozilla, 2014). Being an open system, anyone can release badges, and this poses problems in evaluating the real value of the same (Figure 33).

The endorsement represents recognition of the value of the badge by other institutions and enables hybridisation between formal education (school and university) and non-formal education. Part of the value is also given by the platform that issues it and the processes it puts into practice (Stefaniak and Carey, 2019).
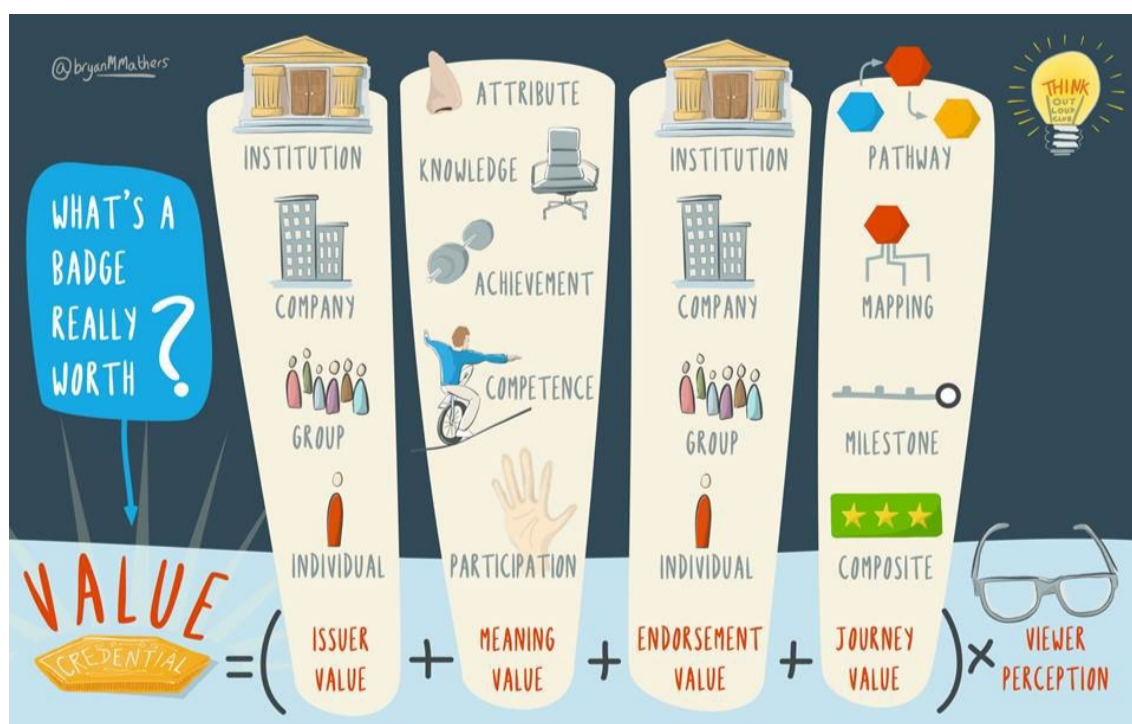
Figure 33 This image illustrates the value of open badges. (What's a badge really worth? by @bryanMMathers is licenced under CC-BY-ND)

3.4.1   Open badges

The advantage of adopting open badges is the recognition of transversal skills, prior learning or skills acquired in both formal and non-formal education that could increase employability if widely recognised by employers (Clements et al., 2020). This flexibility gives the control of the educational path and personal development back to each individual that can collect, display and share badges with the digital community (Naidu, 2017). However, the controversy concerning the effect of the "gamification" of the learning process, recognising the point of view according to which the presence of "external motivators", such as open badges, can have a negative effect on learning (El

Shoubashy et al., 2020). If appropriately designed, open badges can improve learning performance, and promote citizenship (especially around identity and participation) and social integration, for example in the case of recognition of the skills of workers or academic migrants (Dochy et al., 2016; Infelise and Francechi, 2016: 30).

The open badge technology is free and relatively easy to access, and allows independent communities of learners to develop and issue their own set of open badges, using their criteria and frameworks of reference skills (Tátrai and Mihályi, 2016; Infelise and Francechi, 2016). However, the opposite view holds that this openness could involve risks. Individual "issuers" can use open badges to provide organisations and institutions with suggestions and guidance on their needs (Davies et al., 2015). The most innovative and responsive organisations will build open badge systems that consider contributions from the user level (Tátrai and Mihályi, 2016). In general, the response of the final consumers of open badges is essential for the technology to reach sufficient critical mass to be widely recognised.

Badges are attractive in the context of students who gain knowledge and competencies from different sources, including outside their regular study programme (Mathur et al., 2018). The knowledge and competencies made visible through badges can also be impressive for potential employers (Perkins and Pryor, 2021; Clements et al., 2020). Students can make their skills visible with badges on their personal website or on networking websites such as LinkedIn.

Recent research published by the Open Badge Network (Buchem and Bignami, 2017) stated that trust around open badges is indispensable, especially in countries where educational systems are more structured, such as the Swiss and German ones, to precisely identify the areas where this methodology can be more useful and usable. In training systems that are less structured than the Mediterranean ones, including the Italian one, open badges can indeed find wide application margins, provided they can coagulate around that area of trust mentioned, which also raises the possibility of being able to be more open and free than the current one.

Today, many employers look not only to formal education certificates and diplomas but also to a range of extra-curricular activities and interests (Clements et al., 2020; Kumarasinghe and Udeshika, 2015; Lowden et al., 2013: 15). Traditional certification models reveal significant weaknesses in this regard:

1. Learning developed in the formal education and training system neglects a critical set of skills acquired through a great variety of learning experiences

and acquisition areas and produces an underestimation of individual skills in the labour market and, more generally, in the social context;

2. The certification of the curricula, which validates education and training programs to which an individual has been subjected, often leaves gaps in the areas of competence corresponding to the real abilities of the individual;

3. The certification of curricula makes it very difficult to compare different cultural and national contexts, unless developed or accredited by a professional body (e.g. recognised marketing and accountancy accreditations).

Following the significant social changes in the certification models within higher education, there is a real change of direction from a attendance-based certification to a criteria-based accomplishment (Dyjur and Lindstrom, 2017). Digital badges are issued only when the learning outcomes are demonstrated in some way (Casilli and Knight, 2012). The European Qualification Framework is an excellent example of this new orientation taken by educational and training institutions to define a recognised European certification model, which considers both inputs and processes (acquired knowledge and experience) and outputs (learning outcomes). It appears clear how digital badges and micro credentials could therefore benefit and complement it. However, Hart (2015) states that the effectivity of the badges is still unclear as the higher education sector has not fully implemented them, while Stefaniak and Carey (2019) evidence institutions are still to understand the potential use for the badges and therefore not fully prepared to fully embrace their potential.

A recent white paper analysing the Dutch education (SURF, 2016), indicates that many institutions that issue badges use open standards and are mainly directed to professional development. Universities have shown interest in micro-credentialing learning modules in part-time programmes (SURF, 2016: 6). Besides this, the Dutch Ministry of Education, Culture and Science (Directorate for Higher Education and Student Funding) is interested in badges as a pilot for more flexible education and the experiments concerning demand-driven funding in part-time and dual education. Flexible education is now based on learning outcomes and not on educational programmes. The Dutch Ministry believes badges could lead to be a shorter learning pathway and be demand-driven, but the issues surrounding quality must be managed. Badges could also have the process of validation and recognition of pre-acquired competencies made smoother.

3.4.2 Micro-credentials

An open badge is one of the possible options for delivering, storing and exploiting credentials, micro or macro. One of the advantages of using open badges to encapsulate diplomas (macro-credentials) is the possibility to verify them digitally. However, this does not preclude the opportunity to use open badges to replicate the same principle at a smaller scale ("micro-certificates"), while maintaining the potential to challenge existing credentialing authorities.

Problems related to authenticity arise when micro-credentials are used in connection with bite-size learning. Ravet (2015) argues that the micro-credentials' validity is connected to the outcome of various interrelated activities demonstrating different competencies instead of being associated only with a portion of it.

One of the main dangers with micro-credentials is the fragmentation of learning into a series of meaningless activities with no relation to higher-order goals (Haski-Leventhal, 2020). Ravet (2015) states that the risk is for learners to be motivated by obtaining the credentials rather than the desire to learn or achieve something meaningful as a community member. However, the division of modules in higher education into smaller 'bite-size' sections seems to be received positively by students, opening new opportunities in pedagogical innovation (van der Meer et al., 2019).

In some cases, institutions make mutual arrangements about the recognition of each other's formal education (including MOOCs). In the 'Credits for MOOCs' initiative by TU Delft (2015), for example, an international consortium of universities makes arrangements about awarding credits to each other's MOOCs.

Italian higher education and research institutions, collaborating in CINECA[121], have developed Bestr[122]. The name stands for Best-er, which refers to "the best", i.e. what makes you the best version of yourself. Cineca with Bestr is the Italian Contact Point of Badge Alliance, the association to which Mozilla has left a standard legacy and is in charge of its development. Bestr aims to formalise skills needed by the labour market and to guide people in their personal development, for example, by showing skills that complement a profile to make it suitable for new job market demands. The application of open badges to the Italian secondary school context has just begun with work

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[121] Cineca is a non-profit inter-university consortium serving the national academic system. It was born in 1969 by the happy intuition of the Ministry of Education and Rectors of four universities, with the aim of "promoting the use of the most advanced information processing systems in favour of scientific and technological research, public and private."
[122] For more information, please see https://bestr.it

experience in school-time projects. In the 2016/2017 academic year, the Belluzzi-Fioravanti Technical Institute set up a training agreement with CINECA for work experience for its informatics class. Students are awarded an open badge at the end of their experience that can be shared on their social media (Bestr, 2017).

Differently from Italy, badges have been used by secondary schools to support the assessment of the primary computing curriculum (Berry, 2014), to assess an exchange programme (Field, 2016) or IT skills (McKeown, 2015).

In 2019, FutureLearn has introduced micro credentials[123] on some courses within the Common Microcredential Framework that can, in some cases, be used to earn academic credit. For these, learners have to have spent 100-150 hours of part time study over 10-12 weeks[124]. In this perspective, there is the potential for the creation of a series of badges to represent acquired digital skills as well as heritage knowledge.

The opportunity to create badges connected to the skills developed by the students during the two pilots was discussed extensively with the two Italian teachers and colleagues at Southampton. Despite an interest from all parties to experiment with open badges, it was decided to abandon this idea due to the lack of policies in place at Southampton to formally recognise and validate the badges.

3.5 Concluding thoughts

A description of the English and the Italian education systems occupied the first part of this chapter, while the second part was focused on the topic of the recognition of acquired skills. In England, the controversial A-levels reform has streamlined the subject choices to better prepare the students to the work or higher education environment. However, despite archaeology's removal as a full course due to its low enrolment numbers, some archaeology-related teaching is included in 'soft' courses such as history. In this particular aspect, the English educational system reflects the Italian situation where archaeological concepts are included in other disciplines.

A similar situation is manifesting in Italy, where the school system was initially shaped to unite the country before being able to develop students to meet the job market's needs. More recently, the Buona Scuola reform made substantial improvements to teaching with the broader adoption of CLIL and work placements aiming to innovate

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[123] https://www.futurelearn.com/programs
[124] https://futurelearn.zendesk.com/hc/en-us/articles/360036262474

the stagnant teaching system that is unprepared and poorly resourced to meet the legislative demand. Italian teachers of history, geography and other compulsory subjects are forced to develop related materials in a second language with the contribution of teachers of the English language, who traditionally teach only grammar and literature.

Following the results of the Archaeology Forum (2005), archaeologists need to become more self-aware of what their subject offers and more organised to identify and take the opportunity to include archaeology in a more formal educational environment. Both English and Italian systems are offering many opportunities for teaching archaeology not as a subject in its own right but as an additional part of other subjects. This way to integrate archaeology fully reflects the interdisciplinary nature of the discipline. This research study aims to fill these gaps by re-connecting archaeologists and researchers to the school community by offering content that could easily be used to integrate within heritage and archaeological knowledge through a traditional curriculum in Italy and England.

The development of open badges could represent an innovative way to recognise the expertise gained in conjunction with traditional certificates. Despite the substantial progress in the certification models adopted by the institutions of education and training, a transparent and intelligible certification system, without national barriers that recognises individual results throughout the working life and independently of any environment and learning process, is still a challenge to win.

The Archaeology of Portus MOOC represents the perfect opportunity to explore how MOOC materials can be repurposed in compulsory education in Italy given that:

- The MOOC was created within the UK higher education environment
- Its learning objectives have been carefully mapped to QCF entry level 3 to 7 (see Table 3 in the previous chapter)
- The Italian education system can easily be mapped to the English one via the European Qualification Framework
- Both education systems do not have "archaeology" as a subject at secondary school level
- The Italian community was listed as a stakeholder for the MOOC
- The MOOC has a series of resources that have been translated into Italian

Chapter 4   Reflecting on the Engagement with the *Archaeology of Portus* MOOC's content

"It is a fantastic world which opens to us!
Archives, resources, archaeology data services offer a wide range of tools
and opportunities to improve our knowledge of the ancient Roman life.
So we can become more aware of these fascinating issues"

Comment from a learner

Extensive research has been done on MOOC learning analytics to understand the level and depth of engagement with the content produced and the online community. While the number and nature of the comments are usually used to understand learners' behaviour, additional resources such as videos and external links are not usually considered when looking at engagement. This chapter will briefly introduce current research practice as part of the reflection part of the Action-Research methodology (Figure 34), before presenting the Italian community's engagement with the Archaeology of Portus MOOC resources, including blogs, Twitter and Flickr. Understanding how the Italian community engages with such a diverse range of resources and navigates across the different formats allows the consideration of the material selected and ways to interact with the students in the pilots presented in Chapters 5 and 6.
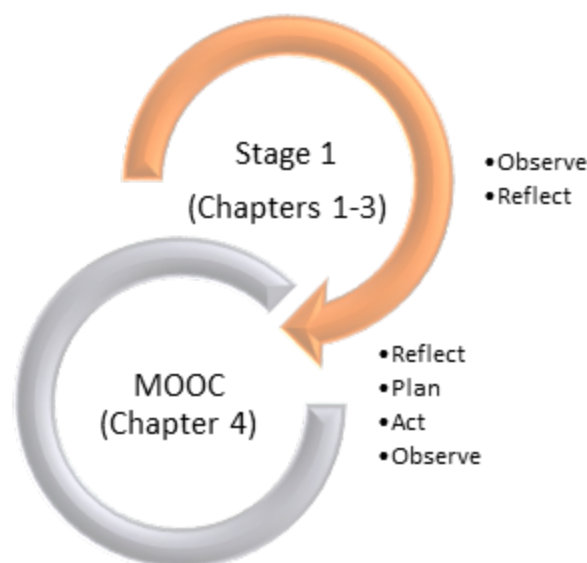
Figure 34 Action-Research methodology as applied in this chapter.

4.1 Literature review

Extensive research on how learners are interacting and learning in digital spaces has been conducted over the last couple of years. Data on learners' interaction with online platforms and with other learners suggests they are behaving differently online than in a traditional classroom or a face-to-face environment (Yu, 2015). One of the reasons might be connected to the fact that open online courses are shifting the more traditional content learning to a 'social' learning space (Siemens, 2008). In addition, little is known about how a different background influences learners' capacity to engage with the course content and platform (Guo and Reinecke, 2014, Liegle and Janicki, 2006). Gameel and Wilkins (2019) have looked at how the Arab speaking community in different geographic areas were engaging with MOOCs translated from English to Arabic. The results collected validated Hannon and D'Netto's (2007) theory that learners from different cultures vary in their ability to utilise online learning technologies.

At the same time, MOOCs can also be considered in relation to the adoption of open educational practices, such as an evolution starting from the concept of 'Learning Object' (Littlejohn, 2003), to the one of 'Open Educational Resources' (OER) (Glennie et al., 2012). This transition, piloted by platforms like #dariahTeach, fully embraces the rationale of a very large scale and open education at the heart of MOOCs. However, one of the main barriers to the reuse of OER is language (OLnet, 2009). Resources may be available, but in a language that users cannot access, so a preliminary step to reuse is in their translation or localisation (Beaven et al., 2013). As demonstrated in Chapter 2, the application of SMOG analyses and Gulpease index to the English and Italian text can mitigate some of the issues connected to language access.

Nkuyubwatsi (2013) discusses his first-hand experience as a learner of different types of MOOCs, praising their ability to offer a flexible and customisable training environment and critiquing the lack of constructive feedback and critical thinking (Daniel, 2012) and low competition rate (Bates, 2012). In the case of the cMOOC, as introduced in Chapter 1, the focus is on the enablement of participant communication and collaboration through a variety of tools, such as Twitter, blogs, wikis, etc. and of using hashtags and similar tools to filter and aggregate information. In this way, each learner defines their own learning path through materials: taking and mixing the contents, the activities and the communications that are most significant to them. The Archaeology of Portus MOOC fully embraces this learning opportunity linking a variety of additional resources to the course on FutureLearn.

Participation in MOOCs can range from informal and non-accredited, to formal involvement, as part of a structured journey. In some cases, "paying" students who receive educational credits, attend the same classes as "non-paying" ones. In some cases, the study will focus on the role of moderators that are not only facilitating the learning but also identifying the learners' struggles and issues to direct them to the appropriate learning path (O'Riordan, 2018).

Data from MOOCs hosted on edX between October 2012 and May 2018 demonstrates an average enrolment rate of over 21,000 (Ruiperez-Valiente et al., 2019) which is double the initial rate recorded by Jordan (2013).

Demographically, available data suggest that most students come from first-world countries (Jordan 2013) and that a substantive proportion of enrolled students in MOOCs are educated to at least a tertiary level. MOOCs usually have very low retention rates of under 5%, even though enrolment numbers are high (Reich, 2014; Reich, 2019). This is sometimes considered a sign that MOOCs are not successful or worthwhile (Konnikova 2014). Pappano (2012) puts forward the view that the concept of 'dropping out' of a MOOC is necessarily different from the concept in traditional, formal educational systems where is has been associated with the poor quality of the material included in the course or on the structure itself. Similarly, Silari (2019) has argued this could reflect the status of a person that is interested in a subject and open to receive training but not equally committed to investing time on the learning platform. The open nature of the MOOC means students make various levels of commitment to the course and sometimes are only interested in portions of the course content.

Most research on MOOCs' analytics is focusing on the direct interaction of learners with the design of the platform (e.g. the number of clicks, comments or time spent on a page) and on the data mining aspect connected to processing a large amount of data. In particular, Zalinwska (2018) recognised the need to focus on understanding the fine-grained qualitative data on social interactions happening in the digital environment. In her work, analytics and data gained from MOOCs are used to inform improvements to the interface design.

Italy has not remained neutral with respect to the use of MOOCs as a resource to increase access to education; indeed, online courses have raised a lot of curiosity both at the academic and at the political level. However, the terminology is always rather confusing when it is about describing disruptive technologies. Even the term that identifies the use of technology to support the learning process is still today subject to debate. In a short space of time, different terms have been proposed (Conole and

Oliver, 2007) and include: educational technologies (Spector, 2014), learning technologies, 'networked learning' (Chen et al., 2020; Jones et al., 2015; Goodyear, 2004), and Technology Enhanced Learning (Wang et al., 2020; Haron et al., 2019; Flavin, 2016). Even when looking at Italian engagement within the web in other cultural situations, Di Marcantonio (2015) describes the lack of user experience testing of the final product, the methodological and linguistic barriers as the main problem to the development of online heritage content, connected explicitly to archaeological and archives catalogues, that does not support neither professionals nor the wider public. She also explains how results from user testing are often scarce and full of assumptions and obvious remarks. Moreover, Di Marcantonio is lamenting that in the Italian cultural heritage sector there are very few cases in which studies are carried out with users. Their satisfaction in using the system is not considered, and even less considered is the user's thought in the design phase itself. This shortcoming is worrying, and users need to be put at the centre of any development.

Since then, the Italian government (MiBaC, 2019) has published a three-year plan[125] for the digitisation and innovation of museums and cultural sites. The document aims to create a national digital ecosystem to discover, access and engage with national collections and includes the use of personas and analytics to monitor users' satisfaction. The focus is not only on the development of practical services, such as buying a ticket or accessing a building, but also on the way the content is presented to the user. The plan also refers to the creation of a shared narrative framework to improve the quality of the communication and interaction offered.

Despite the advancement in this area and the introduction of user experience, virtual reality, artificial intelligence and gamification, the plan is heavily focused on the application of such technologies to the museum space. Little space is given to the development of fully digital experiences that don't require a physical visit.

The work presented in this and the next two chapters is exploring this gap where resources from the MOOC could offer an opportunity to engage with heritage content independently from the presence of a physical museum environment and can be reused in different educational contexts. In addition, by moving the language used from research specific to a more straightforward and understandable language (as described in Chapter 2), it would be possible to engage with around 90% of the Italian population between 16-20 years old. Translations in Italian would also increase the

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[125] http://musei.beniculturali.it/wp-content/uploads/2019/08/Piano-Triennale-per-la-Digitalizzazione-e-l%E2%80%99Innovazione-dei-Musei.pdf

level of potential engagement further. Understanding how users are interacting with the material within FutureLearn and externally linked platforms allow to better understand the community, identify how resources are used or not used and explore potential difficulties encountered by learners. All this information will inform some of the decisions that will be taken in the pilots.

4.2 The Archaeology of Portus MOOC community

The Archaeology of Portus MOOC ran six times between 2014 and 2018, divided across six weeks. The structure of the course was not extensively changed over the years and has reached over 30,000 learners in over 110 countries.

Many have discussed the lack of conceptual clarity over the term 'learner engagement' when addressing the outcomes of online or blended learning. This has led to the conclusion that engagement is the action that leads to effective learning, and that is based on pedagogical aims (Cornelius et al., 2019; Buckley, 2014).

Looking at the online community, FutureLearn (Jenner, 2018; Nelson, 2014) divides the learners into groups based on their engagement with the course material:

- *Registered Learners/Joiners:* this is the number of users registering for a course. Some courses have the registration capped to ensure the support offered by the facilitators is adequate.
- *Learners:* this term defines the group that engage with the material by viewing at least one step of the course. FutureLearn has initially indicated that and an average of 60% (Nelson, 2014) that then decreased to 50% (Jenner, 2018) of registered learners actually visited the course once it began.
- *Active learners*: this group identifies the learners that have been marked as "completed" for at least one step within a course. FutureLearn data shows that 86% of the learners (Nelson, 2014) have used this functionality in 2014, but the data dropped to 35% in the latest published analyses (Jenner, 2018).
- *Social Learners*: this group defines the learners that engage in a conversation by posting or replying to a comment posted in one or more of the steps. This group represents the 'participation' element of the MOOC and FutureLearn is interested in 'participation' rather than 'completion'. The main focus is on the quality of the learning experience rather than testing the learning. In this case this group increased from an average of 34% (Nelson, 2014) to 49% (Jenner, 2018),

demonstrating and increase in learners' engagement with the platform that sits on the conversational framework developed by Laurillard (2002).

- *Completed Learners:* This group includes active learners that have marked at least half of the steps in a course as completed.

The Portus MOOC has seen a community of over 30,000 enrolled learners (Figure 35), of which 40.49% are active learners, and 16.24% are social learners. Despite an increase of registered learners on the second run, the active and social learners have slightly decreased since the first run. The third run has seen a dip in learner numbers that could be related to the short time between the second and the third run. The percentage of social learners fluctuates between 36.5% in the first run to 22.5% in the third run, to then peak on the fourth run (30.1%) before decreasing to 22.4% on the last run.

Portus MOOC learners data

	1st Course Run 19 May 2014	2nd Course Run 26 Jan 2015	3rd Course Run 25 Jun 2015	4th Course Run 13 Jun 2016	5th Course Run 30 Jan 2017	6th Course Run 28 Feb 2018
Registered learners	7,770	8,932	3,246	5,175	4,262	1,282
Learners	5,103	4,051	1,562	2,468	2,264	976
Active Learners	4,578	3,563	1,197	1,973	1,650	682
Social Learners	1,829	1,289	351	744	549	219
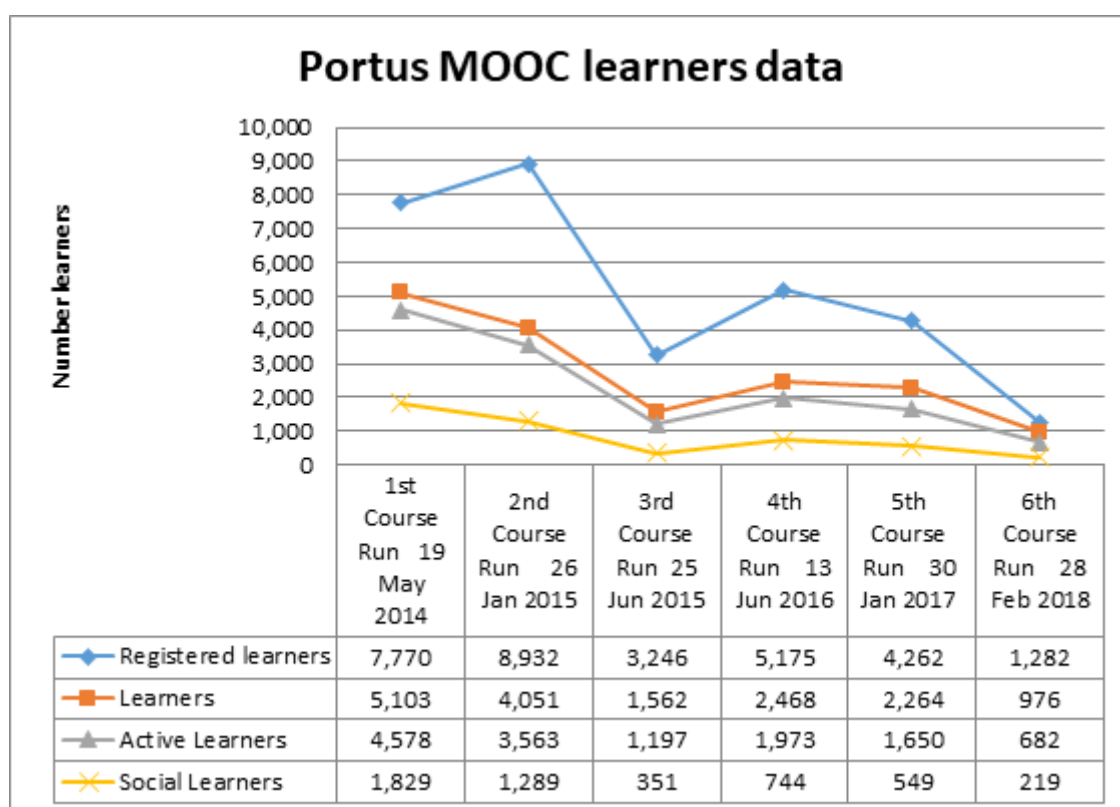
Figure 35 The number of the Archaeology of Portus MOOC learners in each run, divided by type of learner. This data was provided by FutureLearn.

Figure 36 shows the age composition of the learner communities across time. While the initial two runs have seen a high percentage of over 65-year-olds, the percentage of youngest (namely between 18 to 25 and 25 to 35-year-olds) has increased. This is in contrast to the data related to age shared by FutureLearn (Walton, 2016), where only

10% of the entire user group were over 65, and more than 20% were between 26 and 35 years old. Overall, only 16 learners were under 18 years old.

The low representation of under-18-year-olds is possibly connected to the different levels of prior knowledge that MOOCs normally require and the level of support and assistance they might need at a younger age (Burd et al., 2015).

The following chapters will explore how the same content could engage learners in this demographic that might not gravitate independently to the content provided.

Learners Age range Portus MOOC

	1st round	2nd round	3rd round	4th round	5th round	6th round
unknown	19	34	7	33	27	7
>65	383	441	87	333	229	99
56-55	215	248	67	208	154	59
46-55	119	132	39	127	102	33
36-45	77	94	32	126	82	22
26-35	51	70	44	155	107	15
18-25	14	18	16	78	81	20
>18	1	2	1	8	4	0
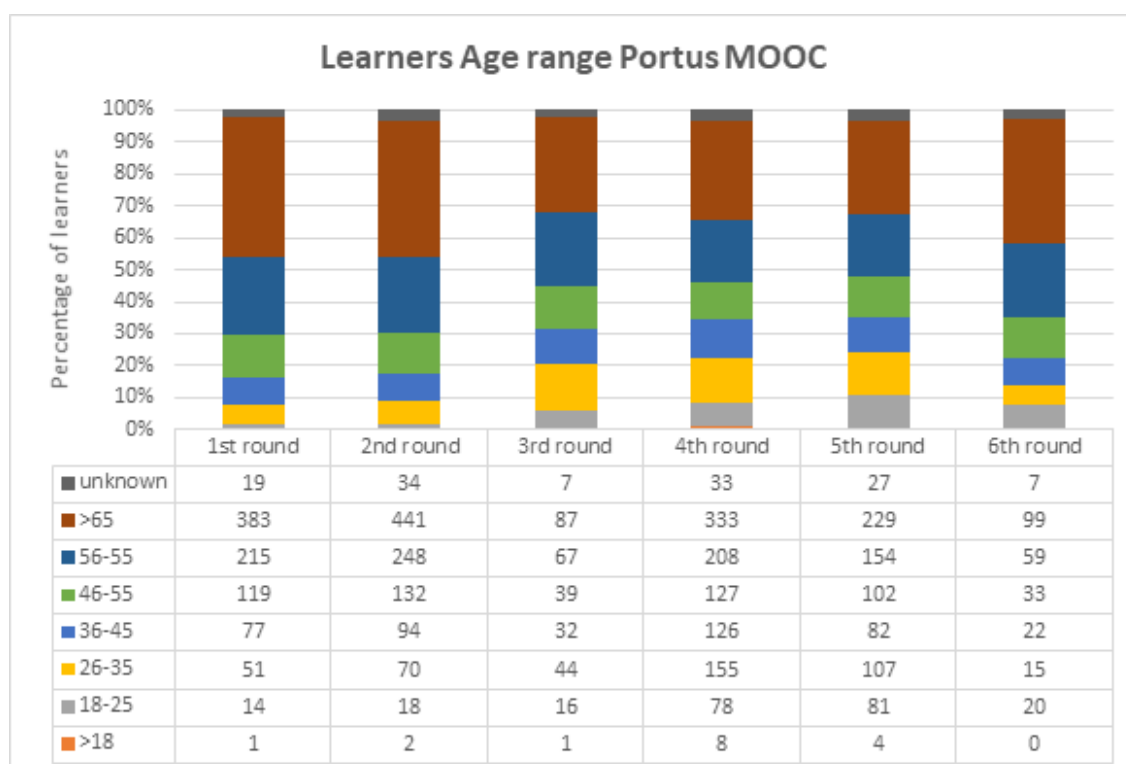
Figure 36 Learners' age ranges from the Portus MOOC analytics. The data was provided by FutureLearn joiners, who completed the initial survey. 'Unknown' indicates that the answer was left blank.

The statistics suggest (Figure 37) that the majority of people who do sign up for the course have some form of education, with the highest number of learners having a university degree across all the runs. In this case, the data is in line with the data shared by FutureLearn (Walton, 2016), that stated that only 27% of the learners registered do not have a degree.

If we consider occupations, learners that are or have been working in the teaching and education sector are the majority of learners, followed by learners in the creative and culture and health and social care sectors (Figure 38).

Portus MOOC Learners Education Data

	apprenticeship	less than secondary	professional	secondary	tertiary	Univeristy Degree	University Master	University Doctorate
1st run	2	8	50	64	76	405	209	60
2nd run	1	10	47	101	106	406	296	60
3rd run	0	5	9	37	23	124	75	21
4th run	6	20	54	140	85	407	296	50
5th run	3	4	50	113	83	286	198	45
6th run	2	3	26	29	23	103	51	16
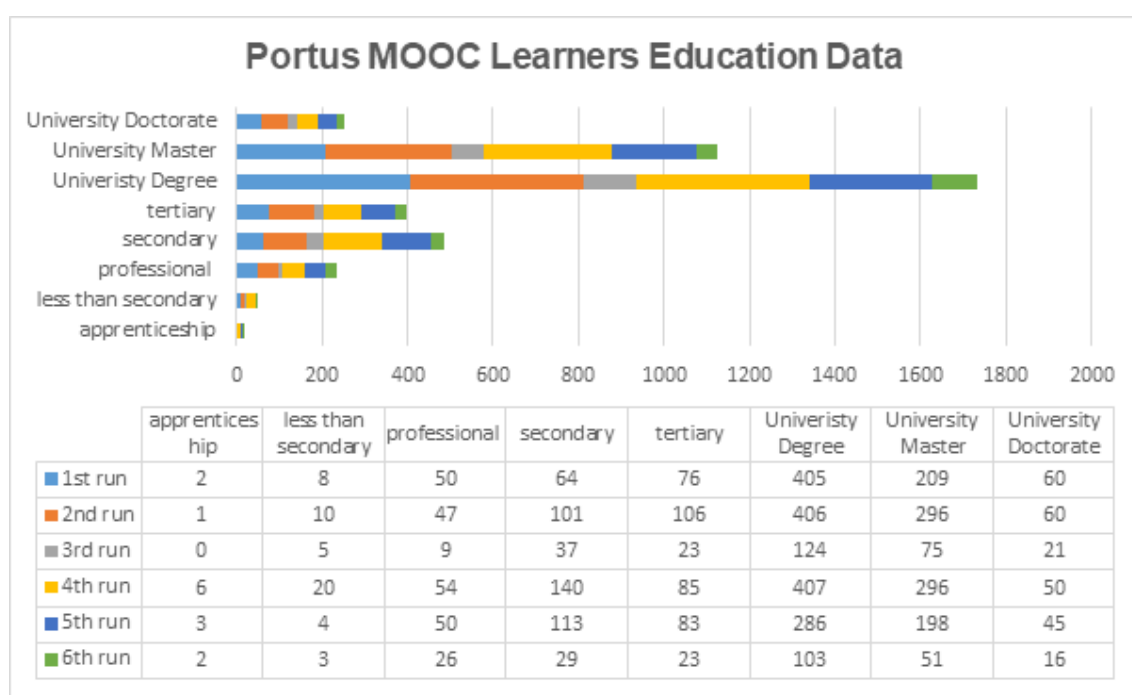
Figure 37 Learners' education data based on FutureLearn enrolment data.
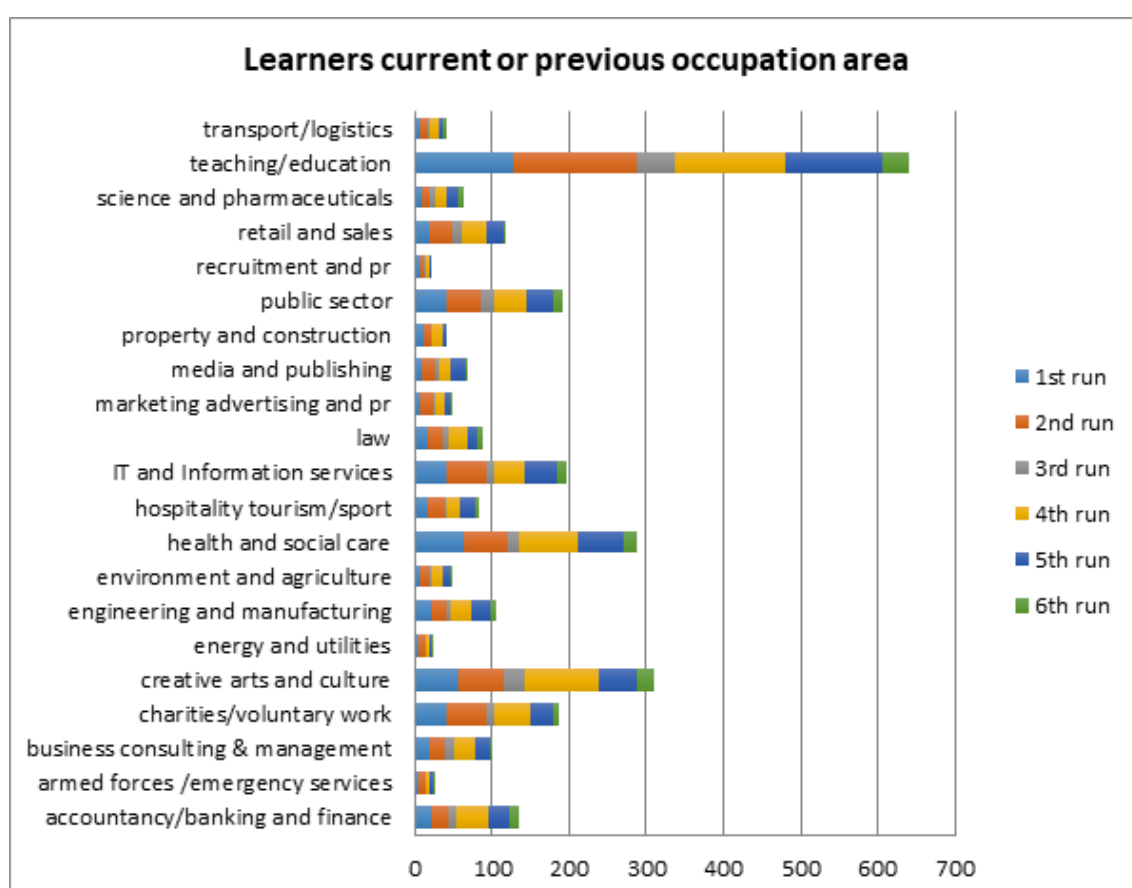
Figure 38 Learners' occupation area based on the data provided to FutureLearn at the time of enrolment.

However, over 20 different sectors are represented across almost all runs, supporting the statement made by Earl (2014a) that it was hoped the MOOC would be of interest to a wider community, given the multidisciplinary nature of the subject.

One of the first attempts at looking at community engagement ongoing within the Portus MOOC was made by O'Riordan (2019) as a pilot study for his PhD research. He analysed more than 20,000 asynchronous comments shared in 2014 to explore correlations between inferred levels of critical thinking (from scores derived from pedagogical content analysis) with standard measures of engagement, the level of intentional user-feedback ('likes' per comment), and linguistic features (e.g. word count, pronoun usage, sentiment). O'Riordan coded a sample using different methodologies such as Community of Inquiry Cognitive Presence Dimension (Garrison et al. 2000), Bloom's Taxonomy (Bloom et al., 1956), Structure of Observed Learning Outcomes (SOLO) Taxonomy (Biggs and Collis, 1982) and the DiAL-e Framework (Atkinson, 2009), to identify the different levels of engagement within the platform. Similarly to other MOOCs, the initial stage of engagement with the platform and the community is represented by the encouragement to introduce themselves and discuss their interests and background. This initial step aims to break the barrier to discipline-specific language and identify critical thinking. O'Riordan (2019) started analysing the learners' introductions identifying a trend in learners of this MOOC that were adopting a discipline-specific language. The outcome of the non-conclusive analyses showed the use of a mix of distinctive terminology typical of the academic archaeological discourse used by the learners. Besides, this study contributed to the understanding of the limits in the use of 'likes' as indicators of on-topic engagement and established links between learners' language use and their depth of learning.

Comments from all courses produced by the University of Southampton until March 2015 were visualised by Earl (2015) in an attempt to understand the place that the Archaeology of Portus learners fit within the community of learners. The below graph (Figure 39) shows the connections between courses based on learner comments in both courses and excludes the enrolment data. Overall links between heritage courses (Portus 1, Portus 2, and Shipwrecks) is simple and not surprising, like the one with the connected Oceanography (Ocean) MOOC. The data was used to create additional cross-references between courses like the one already in place with the *Hadrian's Wall* MOOC.
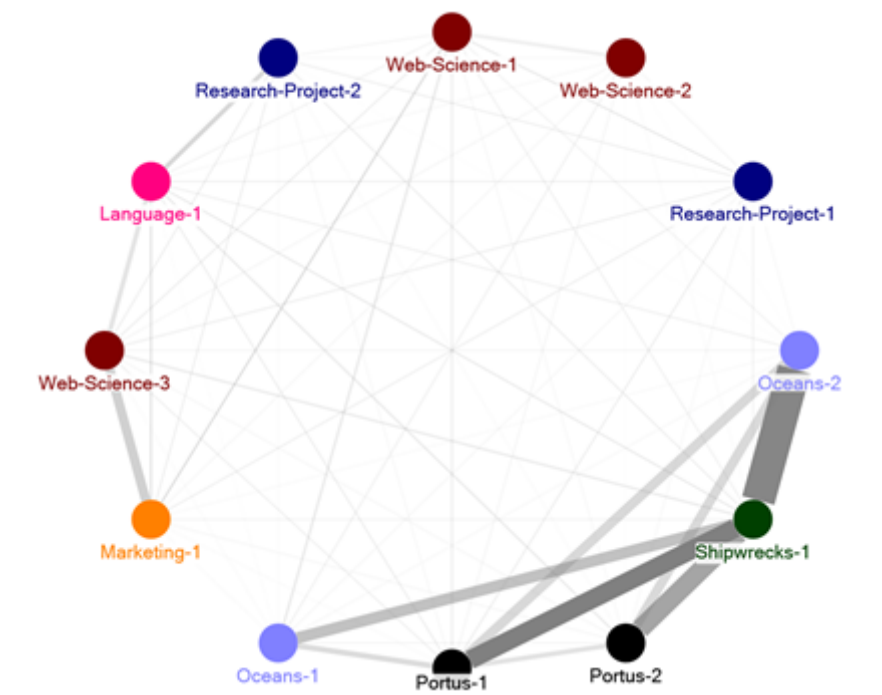
Figure 39 This image shows the connections across different MOOCs (image created by Graeme Earl in NodeXL in March, 2015). The line thickness and transparency corresponds to the percentage of actually shared authors relative to maximum possible authors.

Earl's reflection was published on the blog created to support the MOOC[126] and receive the following comment[127], giving us some insight on how learners are navigating through courses and resources providing a direct feedback on what additional information they would like to receive:

"I found this an interesting post. I am one of the oddballs that have done Web Science, Portus-1, Portus-2 and Hadrian's Wall. It might have been interesting to have included Hadrian's Wall in the graph but I recognise that there are issues involved in doing so. The links that have been provided between Portus and Hadrian's Wall are interesting and useful. Additionally they provide different viewpoints on some issues and I am planning to look at these relationships in more detail. I cannot think of any links between Portus and Web Science that would work in the same way. However I would like to investigate Roman sites as a network and see what emergent behaviour if any there is. It might also be interesting to look at Portus as a Complex Adaptive System to see if this provides any interesting insights Doing Portus for a second time was a different experience to doing it for the first time and I feel that I have gained a lot from

[126] http://moocs.southampton.ac.uk/portus/2015/03/09/futurelearn-social-network/
[127127] http://moocs.southampton.ac.uk/portus/2015/03/09/futurelearn-social-network/#comment-24820

it. I am finding it difficult to imagine what I would gain from taking Web Science again but I cannot specify why I am taking this position." Comment posted on 10 March 2015

The Archaeology of Portus MOOC cross-referenced other courses to facilitate the flow of students between MOOCs. However, it also linked many external resources (Figure 40) that have been created over the years. The FutureLearn course acted as a glue between resources where the Archaeology of Portus was used to introduce archaeological content and methodology to a broader audience.
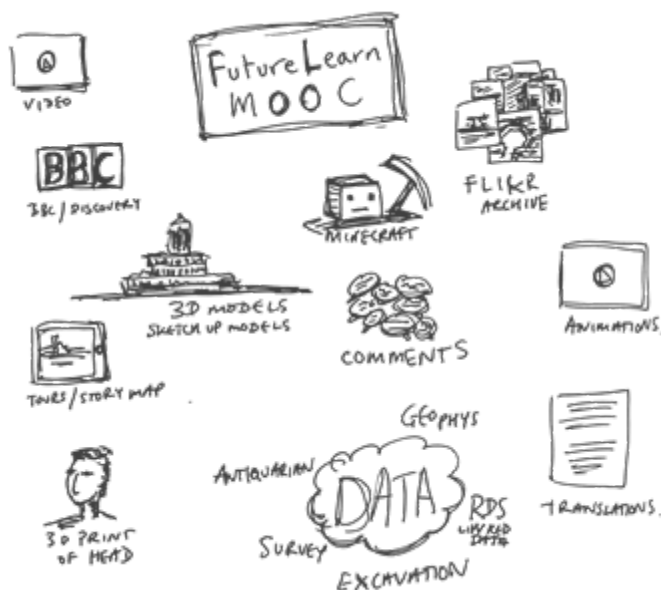
Figure 40 The drawing was created during the Portus thinkathon facilitated by the We are Open Co-op (Mathers, 2016). It illustrates the different assets available to users and connected to the FutureLearn course.

Amongst the many resources created and available to learners, Flickr, Twitter, the Portus Tour and the Portus project and MOOC blogs will be considered for engagement. Data on learner's engagement with platform complementing the MOOC will support decision making on how to structure and use them during the pilots. Overall, the Archaeology of Portus MOOC contains 119 links to external sources, 34 of which are directing learners to Twitter, Portus Flickr, the virtual tour, the blogs and cross references with other FutureLean MOOCs. Moreover, the Archaeology of Portus MOOC blog is used to flexibly add information to the MOOC run with posts to address the most frequent answers of each week.

Week	Step	Step title	Weblink
1	2	**The Portus Project**	**http://www.portusproject.org/**
1	2	**The Portus Project**	**https://twitter.com/PortusProject**
1	3	How to study this course	http://www.portusproject.org/education/portus-summer-field-school/
1	3	How to study this course	http://www.navigareilterritorio.it/en/explore/guided-tours/
1	4	**Resources**	**https://twitter.com/UoSFLPortus**
1	4	**Resources**	**https://tour.portusproject.org/en/**
1	5	The reason behind the construction of Portus and its relationship to Ostia	http://archserve.id.ucsb.edu/courses/arthistory/152k/concrete.html
1	9	The Great Basin of Claudius and the Portico di Claudio	http://edh-www.adw.uni-heidelberg.de/edh/inschrift/HD014574
1	9	The Great Basin of Claudius and the Portico di Claudio	http://commons.wikimedia.org/wiki/File:NERONE-RIC_I_178-87000967_PORTUS.jpg
1	9	The Great Basin of Claudius and the Portico di Claudio	http://www.perseus.tufts.edu/hopper/text?doc=Plin.+Nat.+36.14&fromdoc=Perseus%3Atext%3
1	9	The Great Basin of Claudius and the Portico di Claudio	http://www.perseus.tufts.edu/hopper/text?doc=Perseus:text:1999.02.0132:life=cl.:chapter=20&
1	9	The Great Basin of Claudius and the Portico di Claudio	http://archaeology-travel.com/street/vatican-obelisk-in-st-peters-square/
1	11	**Study group activity - finding your way around Portus**	**http://tour.portusproject.org/en/virtual_tour**
1	14	The discovery and early knowledge of Portus and ongoing work	http://archeoroma.beniculturali.it/en/archaeological-site/seaport-claudius
1	14	The discovery and early knowledge of Portus and ongoing work	http://www.bsr.ac.uk/
1	14	The discovery and early knowledge of Portus and ongoing work	http://www.ostia-antica.org/indexes.htm
1	14	**The discovery and early knowledge of Portus and ongoing work**	**https://tour.portusproject.org/en/timeline**
1	17	Find of the Week - amphora sherds from Leptis Magna	https://goo.gl/maps/MXxP7D3z1eK2
1	20	**Summary of the week**	**https://tour.portusproject.org/en/claudian**
2	1	The Trajanic ports	http://edh-www.adw.uni-heidelberg.de/edh/inschrift/HD032536
2	1	The Trajanic ports	https://goo.gl/maps/4ENfwt49FUy
2	1	The Trajanic ports	https://vimeo.com/67507306
2	1	The Trajanic ports	https://vimeo.com/81427690
2	2	The Roman Empire under Trajan	http://penelope.uchicago.edu/~grout/encyclopaedia_romana/imperialfora/trajan/forumtrajani.htm
2	2	The Roman Empire under Trajan	http://www.stoa.org/trajan/
2	3	The hexagon - Trajanic expansion of Portus	https://www.youtube.com/watch?v=icmX8NIJFsM
2	3	The hexagon - Trajanic expansion of Portus	https://goo.gl/maps/HgQhBK6Geuy
2	6	Portus and Rome	http://www.ostia-antica.org/piazzale/corp.htm
2	6	Portus and Rome	http://www2.rgzm.de/Navis/Home/NoFrames.htm
2	7	The types of cargo that were imported through Portus	https://m.youtube.com/watch?v=hbLLEfyjqqw
2	8	**Study Group activity: Shipping and ships**	**http://moocs.southampton.ac.uk/portus/2014/06/03/roman-ships-portus/**
2	8	**Study Group activity: Shipping and ships**	**http://moocs.southampton.ac.uk/portus/2014/06/03/roman-mediterranean-shipping/**
2	9	Canals and roads	http://ceipac.ub.edu/MOSTRA/u_expo.htm
2	9	Canals and roads	http://www.ostia-antica.org/piazzale/corp.htm
2	11	Terme Della Lanterna	http://vimeo.com/55039791
2	14	The written record	https://www.youtube.com/watch?v=UDLx0m2Lf9Q

2	14	The written record	http://archaeologicalmuseum.jhu.edu/the-collection/object-stories/the-roman-house-at-hopkins/
2	14	The written record	http://archaeologydataservice.ac.uk/archives/view/amphora_ahrb_2005/zoom.cfm?id=83&img=8BC72FEBC0B08397
2	14	The written record	http://archaeologydataservice.ac.uk/archives/view/amphora_ahrb_2005/
3	1	The landscape setting	https://www.youtube.com/watch?v=S89nnCGlmKU
3	2	Roman Empire in the Later Second Century	http://whc.unesco.org/en/list/183
3	3	Development of the Port	https://www.thesphere.com/402719
3	**3**	**Development of the Port**	**https://www.futurelearn.com/courses/hadrians-wall-2/steps/22276**
3	**5**	**Studying the hinterland of Portus**	**http://moocs.southampton.ac.uk/portus/2014/04/19/recent-discoveries-ostia/**
3	6	Geophysical prospection	http://en.wikipedia.org/wiki/Archaeomagnetic_dating
3	**6**	**Geophysical prospection**	**https://www.futurelearn.com/courses/hadrians-wall/0/steps/5117**
3	8	Aerial photography and LiDAR	http://www.ahrc.ac.uk/research/readwatchlisten/imagegallery/2013galleries/portus-project/
3	**8**	**Aerial photography and LiDAR**	**https://www.futurelearn.com/courses/hadrians-wall-2/steps/22280**
3	13	What do you think this core data can tell us?	http://blog.soton.ac.uk/portusproject/files/2014/05/Advanced-Palaeoenvironmental-Step-Copyri
3	15	Marble cladding	http://formaurbis.stanford.edu/
3	16	Find of the week - uncovering the Portus head	http://arachne.uni-koeln.de/arachne/index.php?view[layout]=buch_item&search[constraints][bu
3	16	Find of the week - uncovering the Portus head	http://www.southampton.ac.uk/archaeology/news/2009/01/15_acrg_collaboration_restores_he
4	2	Portus and the Roman World in the Third and Fourth Centuries	http://www.ostia-antica.org/~atexts/codex.htm
4	3	Excavation and documentation strategy	http://www.ansa.it/web/notizie/rubriche/english/2014/03/03/Pompeii-risks-falling-apart-warns-U
4	3	Excavation and documentation strategy	http://www.museumoflondon.org.uk/collections-research/laarc/useful-links-downloads/
4	5	The excavation process	http://www.southampton.ac.uk/archaeology/research/groups/archaeological_prospection_servi
4	9	Laser scanning buildings	http://vimeo.com/67503776
4	9	Laser scanning buildings	http://news.bbc.co.uk/1/hi/in_pictures/8284478.stm
4	9	Laser scanning buildings	http://vimeo.com/67503776
4	11	Building Five - a possible Navalia	https://www.thesphere.com/403033
4	12	Nails and other metal artefacts from Building Five	http://www.bbc.co.uk/news/uk-england-hampshire-15021956
4	12	Nails and other metal artefacts from Building Five	http://www.museonaviromane.it/
4	12	Nails and other metal artefacts from Building Five	http://www.bing.com/maps/?v=2&cp=26.156513~34.240848&lvl=20&sty=h&form=LMLTCC
4	12	Nails and other metal artefacts from Building Five	http://www.bing.com/maps/?v=2&cp=26.156513~34.240848&lvl=20&sty=h&form=LMLTCC
4	13	Reconstructing Building Five	http://www.portusproject.org/technology/2012/12/reconstructing-portus/
4	15	Find of the Week - Bronze Constantinian Coin	http://www.ostia-antica.org/portus/claudius.htm
4	15	Find of the Week - Bronze Constantinian Coin	http://www.ostia-antica.org/portus/trajan.htm
4	15	Find of the Week - Bronze Constantinian Coin	http://en.wikipedia.org/wiki/Trevi_Fountain
5	5	Basilica Portuense	http://jorvik-viking-centre.co.uk/
5	5	Basilica Portuense	http://www.southampton.ac.uk/engineering/research/centres/isvr.page
5	5	Basilica Portuense	http://www.isvr.co.uk/faciliti/lg_anech.htm
5	**6**	**Some finds from today**	**https://www.futurelearn.com/courses/hadrians-wall-2/steps/22297**

Week	Step	Step Title	Weblink
5	14	Photogrammetry and laser scanning of artefacts	http://meshlab.sourceforge.net/
5	14	Photogrammetry and laser scanning of artefacts	http://www.agisoft.ru/products/photoscan
5	14	Photogrammetry and laser scanning of artefacts	http://archaeovision.eu/imaging/photoscan/
5	14	**Photogrammetry and laser scanning of artefacts**	**https://www.futurelearn.com/courses/hadrians-wall-2/steps/22348**
5	17	Scientific finds analyses	http://www.digitiseddiseases.org/alpha/
5	19	Find of the week - Byzantine cross	https://www.youtube.com/watch?v=Lf_wQdUqgT0&app=desktop
5	19	**Find of the week - Byzantine cross**	**https://www.futurelearn.com/courses/hadrians-wall-2/steps/22306**
5	19	**Find of the week - Byzantine cross**	**https://www.futurelearn.com/courses/hadrians-wall-2/steps/22330**
5	20	**Find of the week - fineware**	**https://www.futurelearn.com/courses/hadrians-wall-2/steps/22293**
6	1	Introducing Week 6	http://www.ostia-antica.org/portus/reliefs.htm
6	3	Excavating the Imperial Palace	http://vimeo.com/67503776
6	4	Building Three and the Palace complex	http://vimeo.com/87886499
6	5	The Amphitheatre	http://vimeo.com/55035955
6	6	The Castellum Aquae	http://vimeo.com/81325181
6	7	Overview of this part of the site	https://www.youtube.com/watch?v=F9OxjXBGPQI
6	8	Your questions answered	https://vimeo.com/channels/portus
6	8	**Your questions answered**	**http://moocs.southampton.ac.uk/portus/2014/06/21/race-bioarchaeology-else-can-human**
6	8	**Your questions answered**	**http://moocs.southampton.ac.uk/portus/2014/06/22/simulating-roman-trade-patterns/**
6	8	**Your questions answered**	**http://moocs.southampton.ac.uk/portus/category/week-one/**
6	8	**Your questions answered**	**http://moocs.southampton.ac.uk/portus/category/week-two/**
6	8	**Your questions answered**	**http://moocs.southampton.ac.uk/portus/category/week-three/**
6	8	**Your questions answered**	**http://moocs.southampton.ac.uk/portus/category/week-four/**
6	8	**Your questions answered**	**http://moocs.southampton.ac.uk/portus/category/week-five/**
6	8	**Your questions answered**	**http://moocs.southampton.ac.uk/portus/category/week-six/**
6	8	**Your questions answered**	**https://www.flickr.com/photos/portusproject/collections/72157644285058793/**
6	8	**Your questions answered**	**https://www.flickr.com/photos/portusproject/map**
6	8	**Your questions answered**	**https://www.thesphere.com/profile/781581**
6	8	**Your questions answered**	**https://www.thesphere.com/profile/781581**
6	8	Your questions answered	https://m.youtube.com/watch?v=eENVhX-FoR4
6	8	Your questions answered	https://m.youtube.com/watch?v=KAZn3RwzOU8
6	8	Your questions answered	https://www.youtube.com/watch?v=Dpz_c6trYkg
6	8	**Your questions answered**	**http://moocs.southampton.ac.uk/portus/2014/06/26/simon-introduces-2014-portus-field-s**
6	8	Your questions answered	https://www.youtube.com/watch?v=rwrrJu7Izlk
6	8	Your questions answered	https://www.youtube.com/watch?v=7s2clE74qW8
6	8	Your questions answered	https://www.youtube.com/watch?v=q3s3vOnxVSk
6	8	Your questions answered	https://www.youtube.com/watch?v=Sq24DbX5h28

4.2.1　**Portus Flickr**

The Portus project created a Flickr account in 2007 (Figure 41) to share images related to the research undertaken on the site. Over the years, 731 photos were uploaded and enriched by 289 tags and over 500 geotags, attracting just under 1.4 million views.
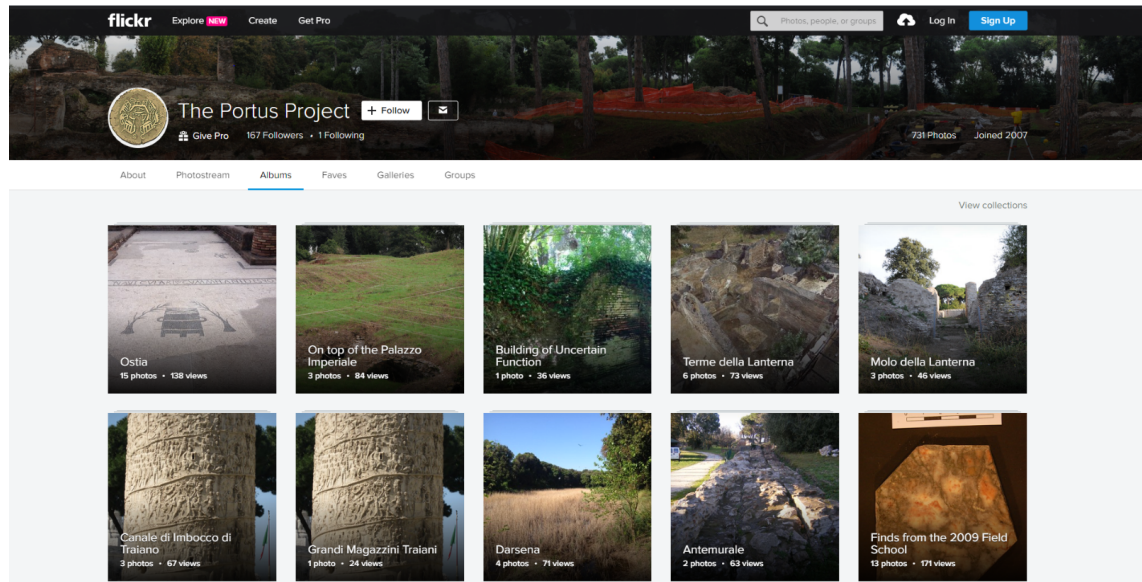
Figure 41 Content related to the Portus project on Flickr

The content was also organised into different albums to represent different steps in the MOOC. The folders that have attracted a significant number of views (over a thousand) are the one related to specific buildings and finds. Each album was introduced to support a step of the MOOC providing a static and illustrative image of objects, maps or a moment on the excavation.

The one related to the Palazzo Imperiale has been visited over three thousand times, however no further analytics such as the country of access or navigation to the site is available. Only three pictures received comments in 2010, from the administrator of another Flickr group who wanted to add the images to the resources of their group. Overall, the images have been shared with over nine different groups.

One of these is the Archaeology of Portus course group, created to support learners on the related MOOC run by the University of Southampton and FutureLearn (Figure 42). One hundred and fourteen members have joined the group since 2014 to access the over 160 images shared. The majority seems to be users with a restricted number of links and only 11 have shared more than a hundred images in the platform. A discussion was also created to ask if any of the members that had visited Portus had

photographs to share. Only seven members commented with short posts, of which only two visited the site and shared images collected.
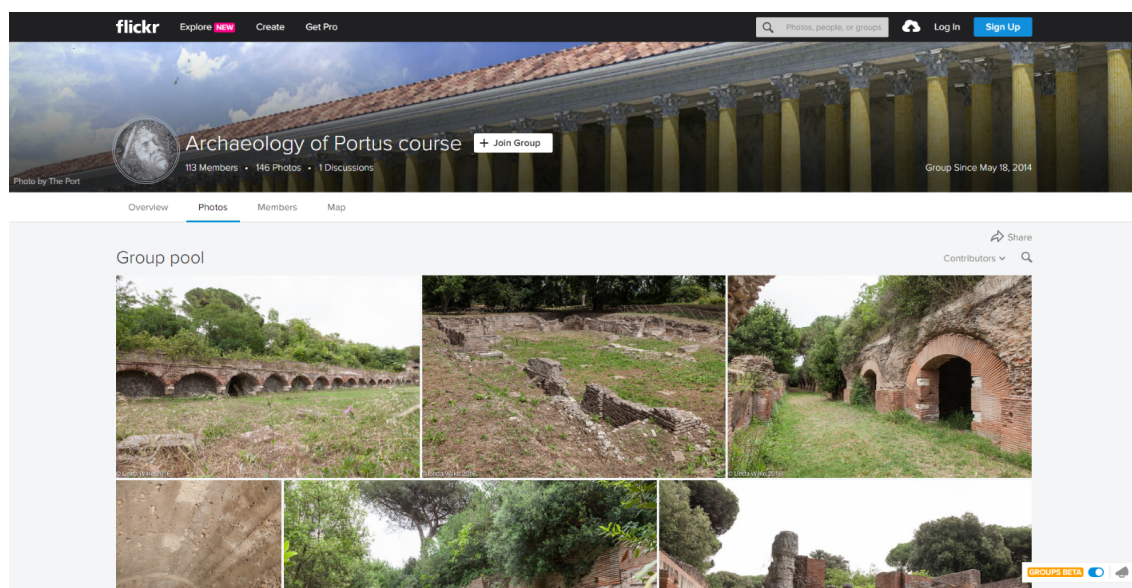
Figure 42 Images of the Flickr group created to support the MOOC

It appears that learners using this resource have done it passively, mainly to access the content and with minimal interaction given by posts or comments. In addition, Flickr does not support the automatic translation of captions in multiple languages[128] like some other platforms, which might have contributed to decrease the level of engagement on this platform.

The *Archaeology's Dirty Little Secrets* and *Hadrian's Wall: Life on the Roman Frontier* MOOCs have also used Flickr to offer learners additional images about the site. However, the number of photos uploaded seems to be more contained than the one shared about Portus and the interactions seems to be really limited.

4.2.2   Portus Website and Blogs

The MOOC also linked to a pre-existing Portus project website[129] (Figure 43), developed to formally present the progress of the excavation and research, and to an Archaeology of Portus MOOC blog[130] , developed as a flexible and complementary resource to the MOOC.

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[128] A Flickr forum post enquiring about multi-language caption was posted in 2013 (https://www.flickr.com/help/forum/en-us/72157637536237875/). Since then no further development or discussion has been found. The only solution offered is to include all translations of the same text in the same image description.
[129] https://www.portusproject.org
[130] http://moocs.southampton.ac.uk/portus
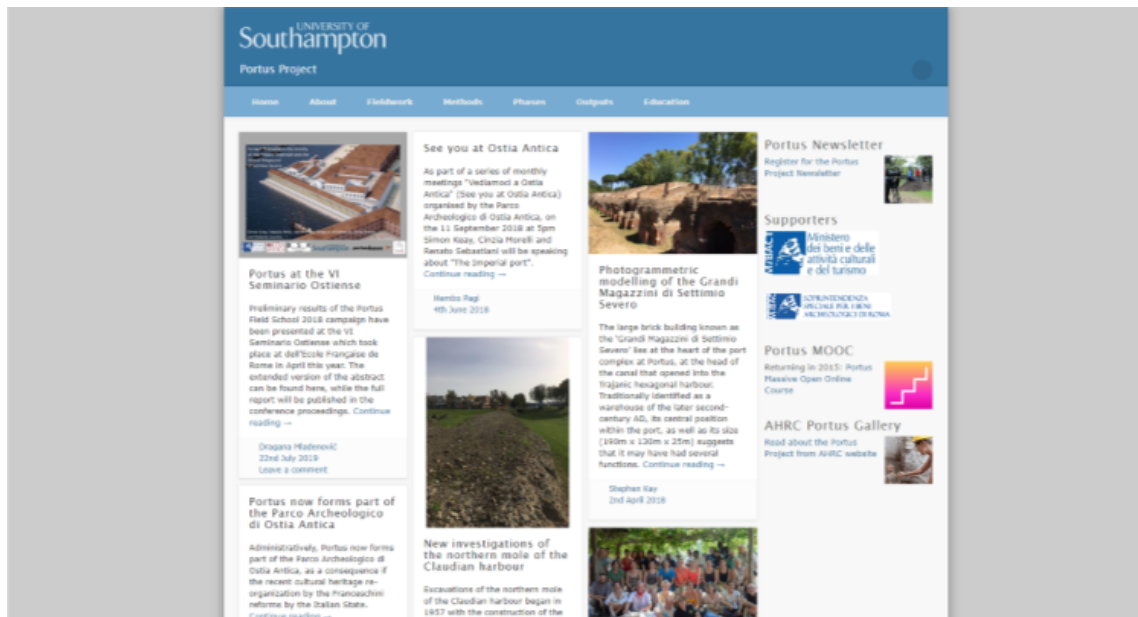
Figure 43 An image of the Portus project website (https://www.portusproject.org/blog/).

Both websites use the same template for consistency. While the project website is static content-wise, posts on the blog are added more dynamically and in response to some of the questions emerging from the MOOC's comments. Overall, 57 posts were written between 2013 and 2016 (Figure 44). With the exception of the initial six blog entries introducing the course, and the BBC documentary, the remaining were explaining in more detail some of the concepts included in the course to stimulate conversations between learners. A total of 203 comments in the English version were posted across 22 different posts.
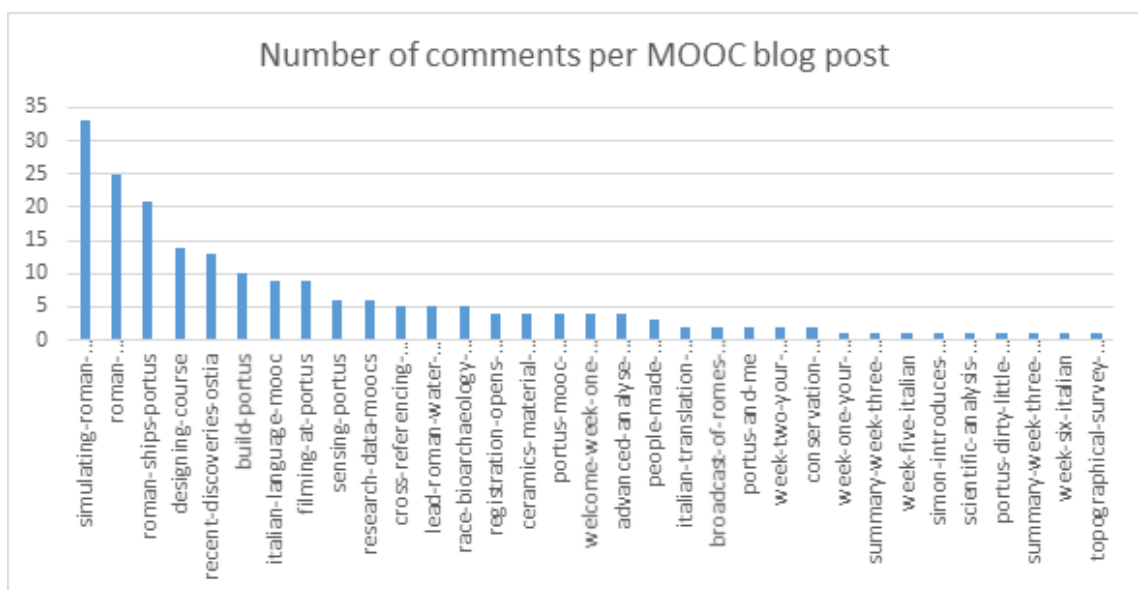
Figure 44 This graph illustrates the number of comments for each of the Archaeology of Portus MOOC blog posts.

Conversely, only two comments were made on the posts in Italian:

"Salve, il corso lo seguo in inglese senza alcuna difficolta'. Tutte le lezioni per mia comodita' vengono trasformate in PDF. Pur avendo poco tempo, non essendo del ramo mi prendo un paio d' ore notturne da dedicare come cultura personale a questo " vs. ottimo lavoro " .

"Hi, I follow the course in English without any difficulty. All the lessons for my convenience are transformed into PDFs. Despite having little time, not having the same background, I take a couple of hours at night to dedicate to my personal cultural development thanks to your very good job " .

The blog has over 25,000 new users across all the MOOC runs, the majority of who are from the UK (42%), the USA (18%) and then Italy (4.46%). London, Southampton, Rome, Sydney and Melbourne are the top five cities for new users. Data from Google Analytics shows that 80% of users have their browser language settings in English (including both US and GB variables), followed by a 3% of users that have Italian set as the language and 1.6% that have French.

Session Duration ?	Sessions ?
0-10 seconds	28,433
11-30 seconds	1,845
31-60 seconds	2,131
61-180 seconds	4,273
181-600 seconds	4,647
601-1800 seconds	3,639
1801+ seconds	903
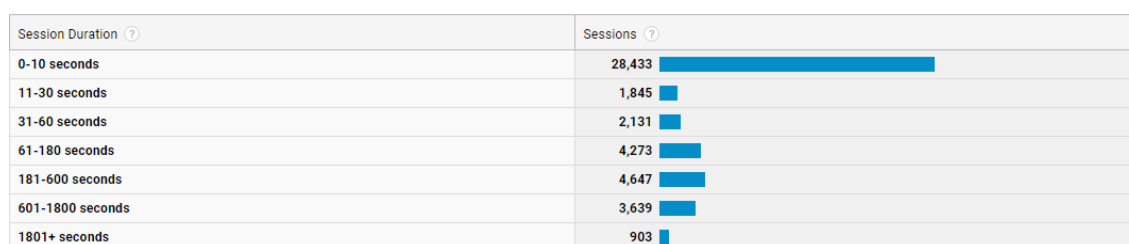
Figure 45 Data on the duration of sessions.

In addition, the data shows that despite a high number of quick sessions where users leave the web pages within 30 seconds, denoting low interest in the content, there are a high number of longer sessions between three and ten minutes or longer (Figure 45). This could be a sign that learners spent more time engaging with the content.

4.2.3   Portus Tour

An initial app (Figure 46) was commissioned to artist Ian Kirkpatrick around November 2012 for a British Academy event at the British School at Rome. The digital content was created to run through iContext, and the files were moved into the app through iTunes. The files used .PNG images and had a .plist extension. This resource has never been made public and was only accessible on the iPad used during the event.

Figure 46 The first Portus app created by Ian Kirkpatrick with the technical support of
Hembo Pagi and Peter Wheeler.

At the same time, the Portus project partnered with Microsoft Research and UC
Berkeley to create a ChronoZoom timeline describing Roman archaeology, with a view
to populating a timeline for the Roman world in due course. Portus (Figure 47)
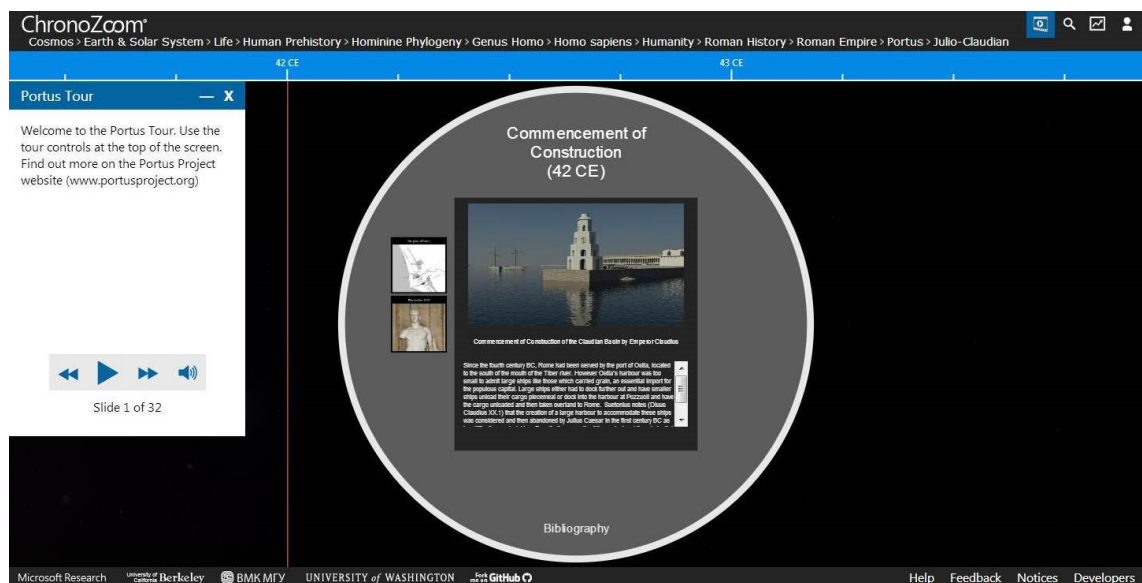
Figure 47 A screenshot from the Portus tour in ChronoZoom (image: Portus Project/
UC Berkeley/ Moscow State University/ MSR).
http://blog.soton.ac.uk/portusproject/files/2012/07/16.jpg

A second development was created as a pilot by Peter Wheeler as part of his Master's dissertation in 2014 (

Figure 48). The Portus Tour website was designed to be a bilingual, cross-platform and user-friendly site that was easy to navigate through in order to give the viewer the best experience of virtually touring Portus. The website was designed using the same layout of the Portus app and was to integrate the MOOC.

Having contributed to the design of the Portus Tour site, it was deemed appropriate to use this layout as the template for the trial website of this dissertation.

Figure 48 An image showing how to access the tour as created by Peter Wheeler in 2014 (Wheeler, 2014: 46). Despite the website still being accessible (http://blog.soton.ac.uk/portustour), this iteration of the tour is not accessible anymore online.

The tour was tested by students participating in the fieldwork, and the overall reception was positive. The layout of the tour was thought to be clean and clear. However, many who were questioned commented that it was necessary to seek information rather than have the content displayed automatically. One of the most significant criticisms of the tour was that it did not present the information in as clear a way as possible, suggesting the introduction of more supporting textual information to make the navigation through the virtual environment more understandable. The website had the right amount of textual information, but those essential elements were not made clear to the viewer. It was suggested that the key elements of each page be made more visible. This tour can be compared to the application developed by the University of Newcastle and used as part of the *Hadrian's Wall* MOOC to encourage users' to interact with the data in a different way. Portus shared, with the city of Newcastle and Rome, the challenge of a highly urbanised landscape where archaeological remains have been englobed by the modern city. These online and georeferenced tools, in addition to the 3d models, offer a direct visual reference to learners. However, the long term accessibility of such impactful and interactive tools is not always considered during the development phase leading to the disappearance of the content online.
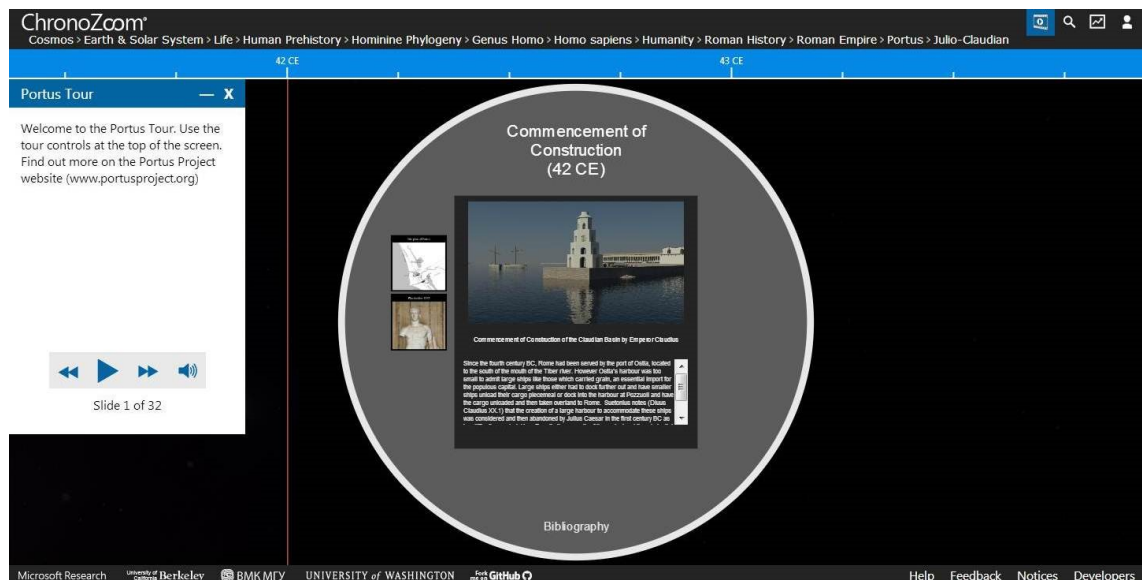
Figure 49 A screenshot from the Portus tour in ChronoZoom (image: Portus Project/ UC Berkeley/ Moscow State University/ MSR). [131]

A new Portus tour (https://tour.portusproject.org/en/) was created in 2016 (Figure 49) to help to navigate the site of Portus in space and time, taking into account the feedback from the previous version. Wheeler structured the information around five periods of occupation of the site (Claudian, Trajanic, Severian periods, from the fifth to seventh centuries and current site) and included an interactive timeline explaining the history of investigation. While the content provided gives additional notions about the site, it also gives clearer access to some graphical content.

The online tour was created to allow users to virtually explore the site, and if on site, it allowed users to explore the information available while walking through the site, thanks to the geolocation capabilities of the app. A separate timeline offers more information about the history of discoveries (Figure 50).

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[131] http://blog.soton.ac.uk/portusproject/files/2012/07/16.jpg
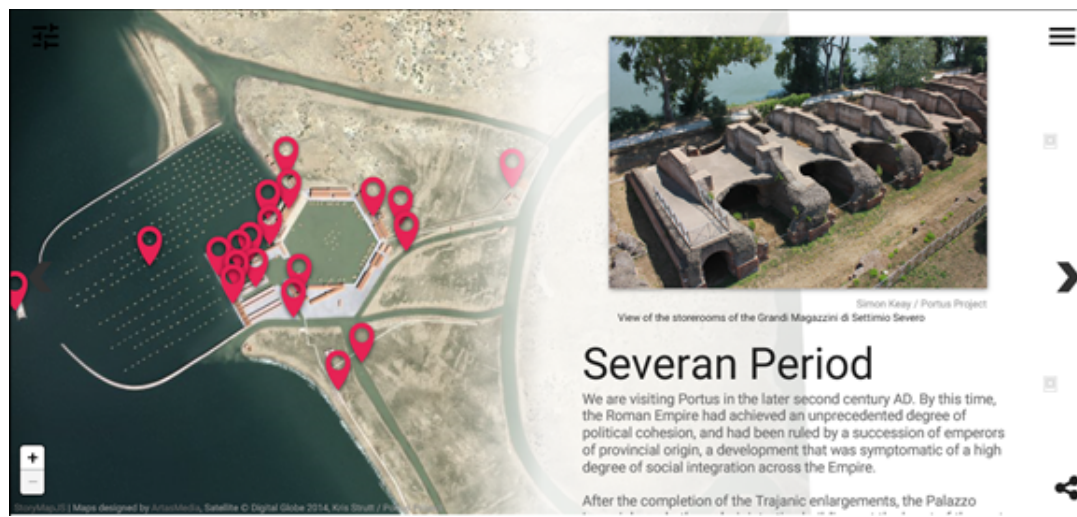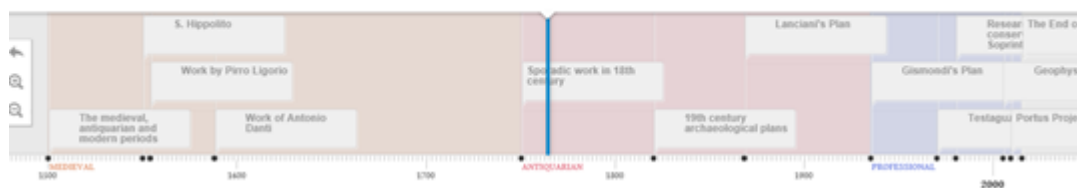
Figure 50 The landing page of the latest developed tour is the top image, while the image on the bottom illustrates the timeline included in the tour.

During April 2016 and June 2018[132], over 5,770 users have used this resource in over 10,000 sessions. Data from google analytics (Figure 51) indicates that usage peaks during the running of the course. In 2017, there was a high number of new users (over 500 in a day) before the start of the course.
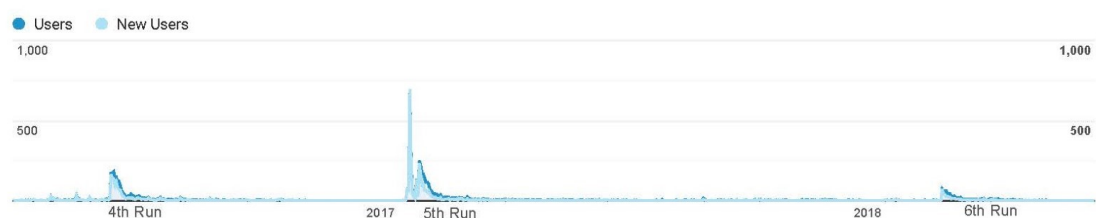
Figure 51 Google analytics provides a screen shot on access and usage of the tour.

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[132] Period from the creation of the tour to the end of last Portus MOOC run.

American English is the most used language (33%) for users of this tool, followed by British English (30%), Italian (14%) and German (5%). This might not give us a true picture of the different communities engaged with as we are noting that there more users from the UK (34.75 %) than Italy (19.32%), the USA (12.74%), followed by Australia (4.17%) and Canada (3.24%). Users based in Germany did not reach 3% of users.

The data also allows us to look at how the users are navigating the content. Over 60% arrive to the tour directly without a traceable referral source, 22.35% via Facebook (835 new users) and Twitter (450 new users) and 15.83% is via a referral (919 new users). FutureLearn is the biggest source of referrals for the over 770 users out of the 919, followed by the Italian Ministry website[133] with 19 users, the section of archaeology of Rome on the Italian Ministry[134] website and Portus tour with 14 users referred each.

Figure 52 The map illustrates where the tour was viewed from.

Rome is the area where the Tour was viewed the most, followed by Turin and Milan (Figure 52). This data reflects the location of the site, where most of the people would have used the online tour while at the site and the location of the schools that took part to the pilots presented in Chapter 5 and 6.

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[133] www.beniculturali.it
[134] www.archeoroma.beniculturali.it—this site is not active anymore.

4.2.4   Twitter

In 2013, a dedicated Twitter account was created to separate the interactions from the one dedicated to the Portus project, similarly to what other courses have done to promote engagement and stimulate online discussion. Differently from other platforms, FutureLearn has developed social media (Twitter, Facebook, Google+ and Youtube) guidelines to coordinate messaging and consistency of experience between MOOCs created by different institutions and achieve better results by reinforcing each others' social media marketing activities.[135] Differences between the use of social media by the *Archaeology of Portus* and the *Hadrian's Wall* and the other heritage MOOCs is probably connected to the lack of guidance provided by the host platform that have left educators and learners free to engage with each others as they best prefer.

Figure 53 The Twitter account created to support the Portus MOOC.

A total of 385 tweets have been shared from this account, with the majority of the interactions happening in 2014 and 2015, during the run of the first four MOOCs. Limited engagement occurred in 2016 and 2017 with a total of 7 and 4 tweets, respectively.

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[135] https://www.southampton.ac.uk/~assets/doc/cite-moocs/FutureLearn%20info/Social%20media%20guidelines%2030Aug.pdf
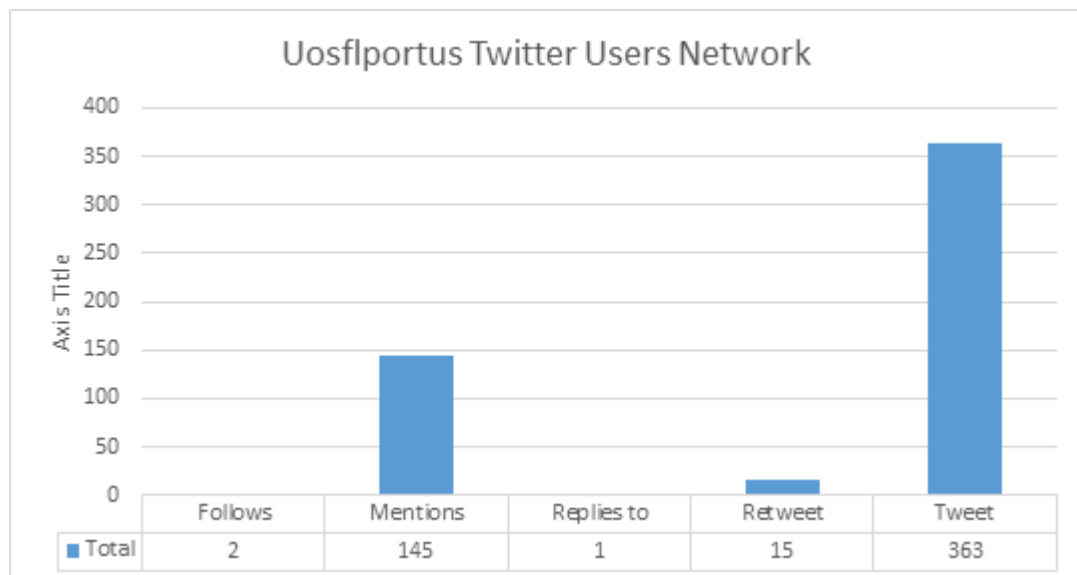
Figure 54 A graph showing interaction with the Portus MOOC Twitter account.

From the data extracted (
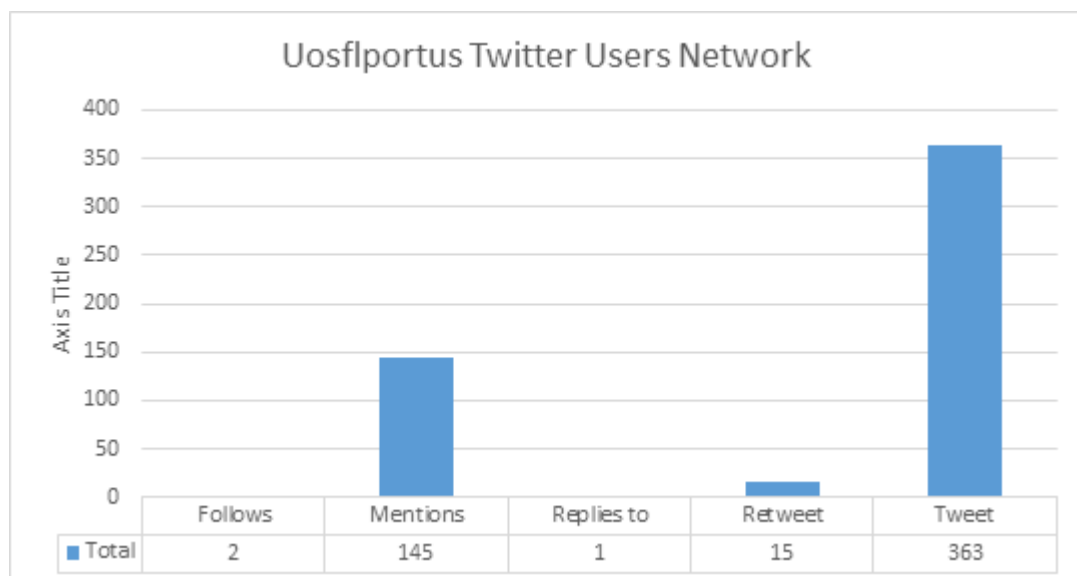
Figure 54), it is really difficult to separate the general community from the Italian one as all of the interactions are in English.

4.3 The Italian community on the Portus MOOC

A clarification is needed before proceeding to analyse the Italian community on the Archaeology of Portus MOOC. The Italian community (Table 15) as intended in this thesis is formed by two groups of users based on the FutureLearn dataset:

- the one formed by users that identify themselves as 'Italian' despite the geographical location from where the course is accessed.

175

- the one where individuals have not expressed nationality or a nationality different from 'Italian' but have accessed the course from Italy (based on I.P. addresses).

Understanding how the Italian community engages with the resources on the Portus MOOC offers the opportunity to understand how a community engages with their heritage online. Any feedback the community has shared over the course of the various runs will help to identify potential issues with the access or the information provided. For example, if a translation in Italian would be useful and how such material is used.

Another thing to note is that there might be different nationalities living in Italy, and that would be included in the Italian community study. In this sense, when the "Italian community" is mentioned in the course of this study, I am referring to the community formed by learners identifying themselves as Italian and learners that have enrolled from Italy despite being of a different nationality.

	Learners identifying themselves as Italian	Learners accessing content from Italy
Run 1	8	N/A
Run 2	11	N/A
Run 3	8	4
Run 4	31 (including access from Austria, Germany and Norway)	71
Run 5	21 (one access from Japan)	70 (includes: 1 German, 1 Turkish and1 Argentinian member)
Run 6	3	22 (1 German member returning from the previous run)
Total	82	167

Table 15 The table shows the number of learners identifying themselves as 'Italian' at the time of enrolment despite the geographical location from where the course is accessed, and the number of learners accessing the course using

an Italian I.P address (an assumption has been made on their geographical location based on the I.P. address used).

The numbers of the Italian community who took part in the MOOC are minimal, no more than 2% in total. However, the number increased in the fourth and fifth run. This increase is probably related to the marketing campaign created to attract an Italian audience, and to the increasing number of resources translated to Italian. If we compare the enrolment data on the Archaeology of Portus MOOC with the one on another heritage-based MOOC created by the University of Southampton and available on FutureLearn, Portus maintains the highest enrolment number from the Italian community with the exception of the two runs in 2015.

Italians enrolled in UoS Heritage MOOCs

	first half 2014	second half 2014	first half 2015	second half 2015	first half 2016	second half 2016	first half 2017	second half 2017	first half 2018
Agincourt				0.57	1.03	0.85			1.29
Wellington			0.17				1.39		
Shipwrecks		0.16	0.15		1.79		1.05	1.22	
Portus	0.11		0.12	0.37	1.88		2.11		1.94
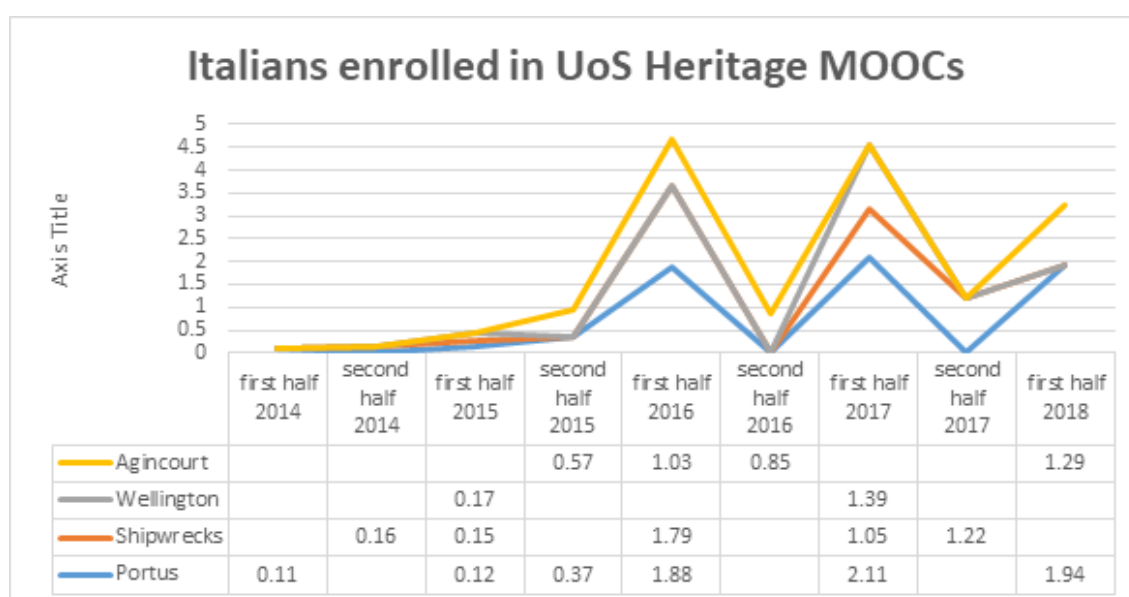
Figure 55 This graph shows the percentage of Italians enrolled in other heritage MOOCs created by Southampton.

From the comments, it seems clear that some learners have previously taken courses together. MOOCs on Shipwrecks, Shakespeare, Richard III and Hadrian's Wall are the most cited in the comments, even is some are mentioning to want to focus on a course to improve their English skills. This is in line with the visualisation produced by Earl (2015) in Figure 55 where learners interested in heritage MOOCs will enrol mainly in those independently from the time period.

It appears challenging to compare the age of the Italian learners with the other participants as the percentage of the learners not declaring their age has grown over the rounds. Figure 56 presents the number and relative percentages of Portus MOOC learners' declared ages. The data shows that the Italian community taking part in the MOOC is formed by an audience of over 25 years of age, with the majority of the

177

learners above 46 years of age. This data is slightly in contrast with the data presented by the Eurobarometer survey (European Commission 2017: 51) indicating that under 25 years old are more likely to visit online websites to obtain heritage information.
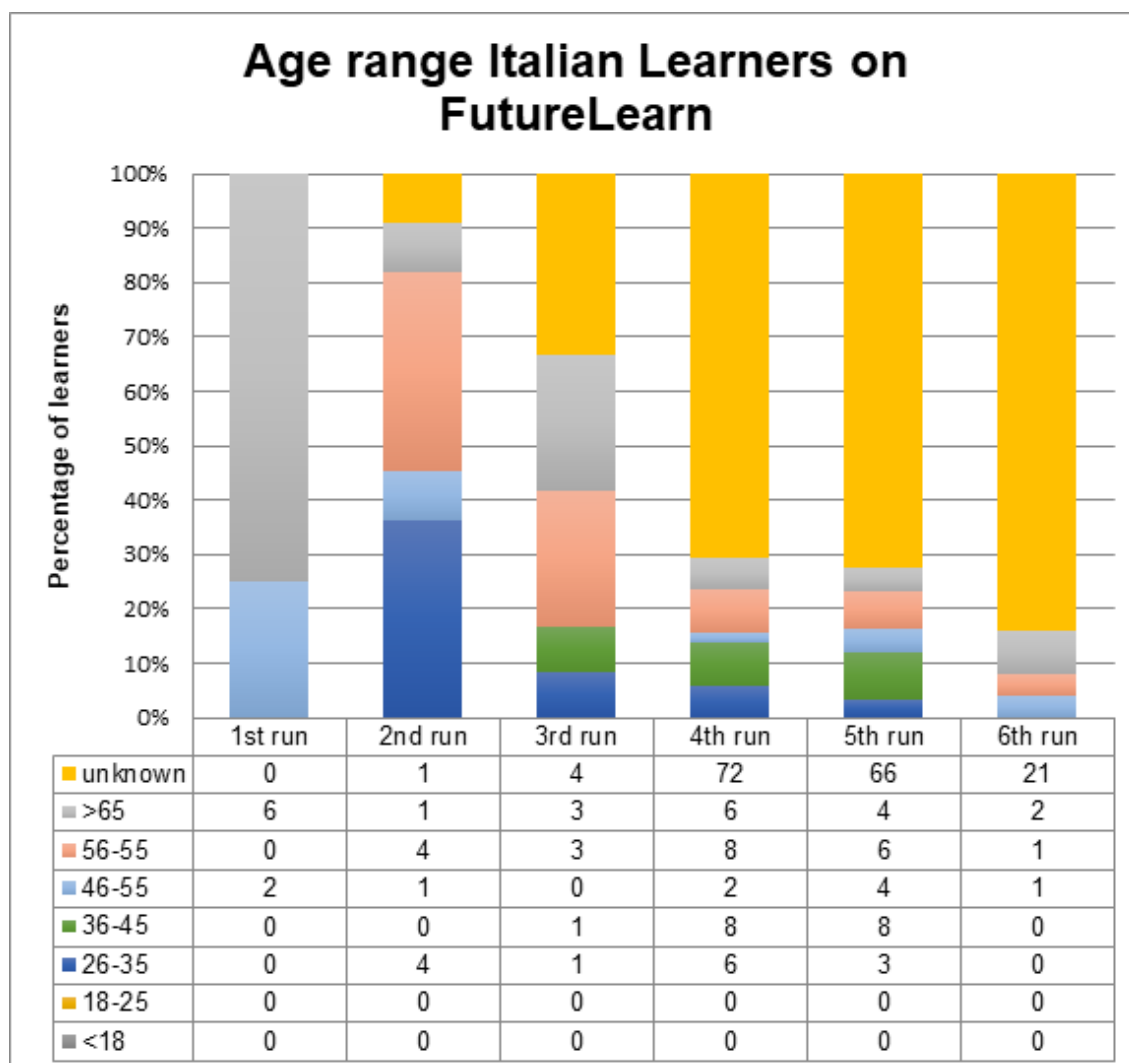
Figure 56 The graph above shows the number and relative percentage of Portus MOOC learners' declared age. The data was collected from FutureLearn at the beginning of the MOOC.

Based on the education data of learners, it appears the Italian community enrolling the Portus MOOC had a higher average level of instruction than the over-enrolment data, with a higher number of learners with a university Masters degree than only a Bachelor degree. This consideration needs to take into account the limited data in relation to the wider number of MOOC participants.

In contrast to the general engagement data where learners have at least a tertiary degree, the majority of Italian learners are educated to university level, with a high

percentage of Post Graduate Taught users (Figure 57). While the top two areas of occupation are in line with the other learners, business and finance are the following areas where learners are working in (Figure 58).

Portus MOOC Italian learners Education Data

	professional	secondary	tertiary	Univeristy Degree	University Master	University Doctorate	Unknown
1st run		2	1	2	3		
2nd run		3		3	5		
3rd run		2		1	3	2	4
4th run	1	6	2	5	14	3	71
5th run	1	4	1	6	11	2	65
6th run			1	2		1	21
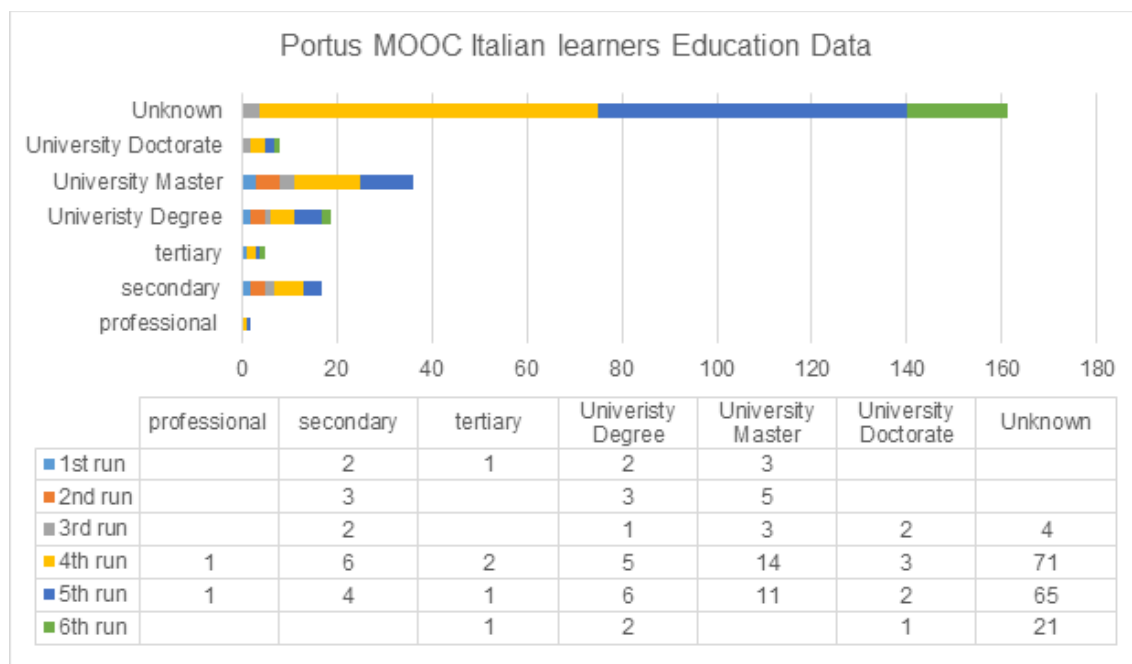
Figure 57 The figure above shows the data from the learners' educational background.

Italian community learners current or previous occupation area
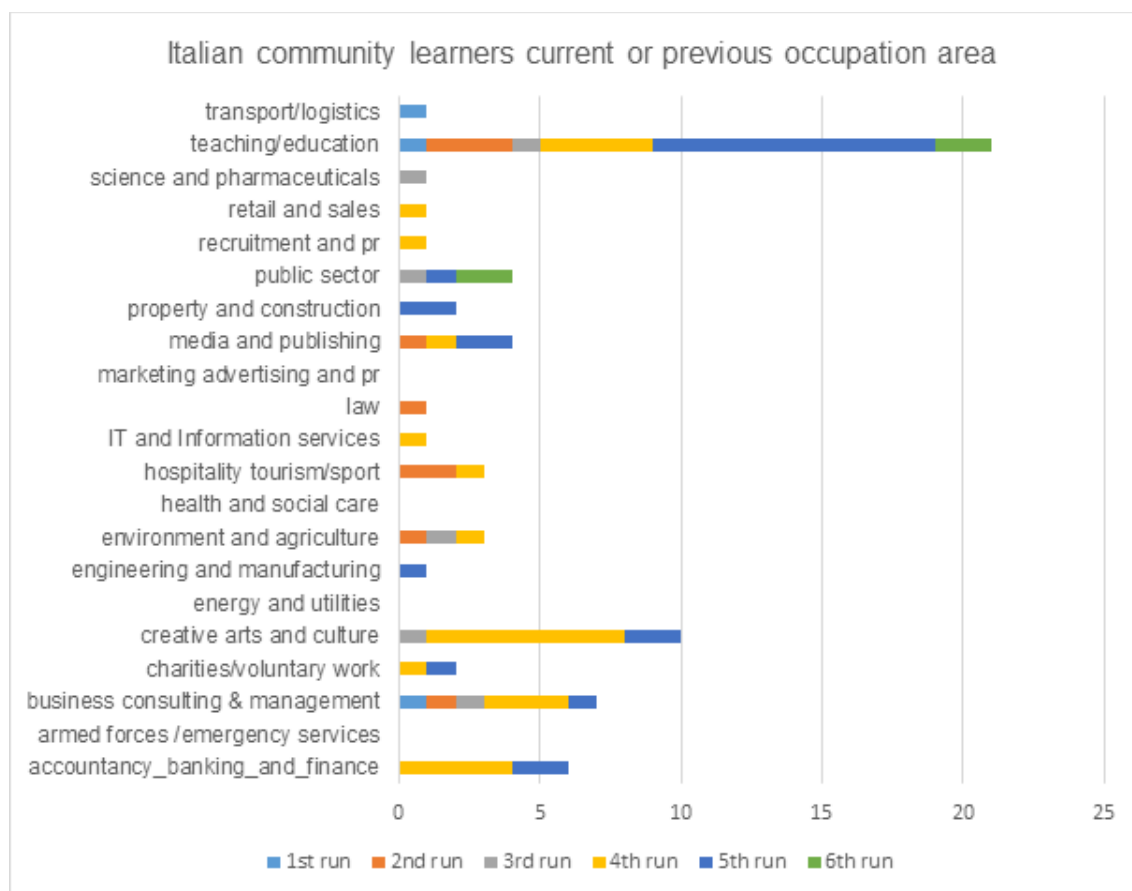
Figure 58 The figure shows the areas of occupation of the learners participating in the Portus MOOC.

179

4.3.1   Engagement with the MOOC

The Italian community created only 668 comments over the six runs, which equates to 0.91% of the overall comments (74,069), and only in two instances, the level of contribution reached more than 1%. Besides this, data suggests that 199 learners from the Italian community have not contributed actively with comments and have used the platform in a more passive way.

	Total number of comments	Number of comments from the Italian community	%	Number of learners contributing
1st Run	20,253	14	0.07%	4
2nd Run	18,846	57	0.30%	4
3rd Run	3,566	33	0.92%	2
4th Run	13,929	350	2.5%	15
5th Run	12,465	175	1.4%	12
6th Run	5,010	39	0.78%	4

Table 16 A comparison between the number of comments from the Italian community and the broader MOOC community. The table also lists the number of contributors.

All comments have been posted by 39 learners across all runs (Table 16) of which two enrolled and contributed in two different runs (5 and 6) and (4 and 5). It also to be noted that one of the learners commented and interacted only in Italian with the others.

To fully understand how the Italian community engaged with other learners on FutureLearn, I have coded all the comments in Nvivo to identify what type of contribution was made by the learners. 14 contributed with less than three comments, while the remaining posted a substantial number of comments.

The interactions have been divided into macro-themes:

1.   *Demographics* – giving information about nationality, hometown or geographical place of residence, current/previous occupation, interest in the course, online learning practices

2. *Historical* – comments directly referencing roman history or architecture

3. *Additional Cultural information* – information shared by learners related to cultural practices or links to other information already available online

4. *Feedback and physical site engagement* – comments including feedback on the resources and on the content, and interest in visiting sites

4.3.1.1 Demographics

From the interactions, it is possible to identify some of the locations represented by the Italian community, which includes learners from as far as Bologna (in the north) and as close as Fiumicino and Roma Area (in the south). The comments show that, with the exception of some learners based in Fiumicino, little about this site is known by the wider Italian community who, in some cases, are not even aware of the existence of the site.

"No, I did not know about the site last time I came in Rome, I live in Bologna." ID 13696792, 4th Run

"…. We have the same problem, i.e. I live in Rome, not far away from Fiumicino, and even if I go there quite often (Airport or Shopping Malls) I'd never realised what was there…" ID 13696079, 4th Run

"No Katherine, I didn't know about the dig in Ostia. I'm pretty disappointed with myself because there seem to be quite a lot of activities going on more or less in my area, and I don't know absolutely anything about them, despite my interest in Archaeology." ID 13748448, 4th Run

"I've been to Fiumicino and back at least 4 or 6 time per year (there are commercial malls and so on nowadays) without ever realising what was there." ID 13695825, 4th Run

In one case, a learner mentions they have visited most of the sites presented during the MOOC, but this represents an opportunity to learn about them form a different perspective.

"I am Italian so I have seen personally most of the sites this lessons will be talking about; however, I think this will be an outstanding opportunity for me to be more aware of this sites in my country from a different and more technical perspetive. I know that

archeology and history, especially in determined period of history, are strongly link into each other. Really ooking foward to atend!" ID 14016982, 4th Run

There are also cases of learners who decide to enrol in the course multiple times as they want to learn more or because they have not finished it the first time due to personal circumstances:

"…..I did this course one year ago and there is so much to learn that I decided to repeat it although I will not be able to comment often - some busy times at work…." ID 26288911, 6th Run

Within the Italian community, there are several teachers, of foreign languages and of classics, someone working in the chemical industry and some heritage professionals (including an archaeologist). Learners are moved to engage with the course from their interests in history, archaeology and classics or just as a way to learn more about :"*the past history or my country and its relationship with the European nations and culture*" out of a feeling that "*our present is linked to the past*". One of the teachers participating was looking at the information that could potentially be used by her class, as mentioned in Chapter 1. Her comments on the FutureLearn platform have facilitated the initial contacts for the first case study presented it the next chapter.

4.3.1.2 Historical

The majority of the comments referencing Greeks, and Phoenicians in relation to Rome are also accompanied by terms like 'in my opinion', 'I believe', or 'I don't know much about it' suggesting the learners are cautious on what they are sharing and are making a clear distinction between what they do know and what they are unsure. In some cases, there is a reference included in the comments, such as "Wikipedia", "I have read this interesting essay on this topic"," I visited that place", to support their statements or opinions. There are also quite a few mentions of famous Latin phrases still used in Italian language:

"'Panem et circense', Bread and circus was the way in Rome to keep social peace, every emperor knew that I had to keep well supplied the City (Rome) of food and spectacle, and Claudio as a member of an aristocratic family was perfecly aware of this necessity." ID 13698571, 4th Run

"'Grecia capta, coepit ferum captorem' that is Greece was conquered from a military point of view but deeply influenced Roman culture." ID 13695631, 4th Run

"This is the best evidence in support of the old Latin motto 'Pecunia non olet'" ID 14803316, 4th Run

And references to other well known places in Rome and roman architecture in more modern buildings across Italy:

"Very interesting about the different building materials and also the animation of the vault construction was very good, Although our house in Umbria was built, we think, around 1880 you still see the mixture of stone and bricks similar to Opus vittatum mixtum in the external walls." ID 3754415, 2nd Run

4.3.1.3 Additional Cultural information

The Italian community also used 36 links in total to share external-facing resources from Wikipedia, in four occasions, to books searched via google, on three occasions, and some Italian websites. It seems the majority of the links are not popular websites, and more localised knowledge is shared.

Some of the comments are evoking memories and are describing romantic views of the Italian landscapes presenting some hard realities connected to the Italian economic and political situation:

"I got to know a lot of snow from Norway and Sweden were I worked for many years, too (as well as in Belgium). But here in Italy in the garden it was amazing to notice snow on lemons, never seen before:)…….... Your mum is Italian, oh the Italian mothers (la mama) are special - in a positive sense, of course, si dice : "La mama e' sempre la mama" - (mum stays always mum) which expresses a certain importance of these mamas here." ID 26221936, 6th Run

"Life is quite hard for most Romans, especially the young people, a lot of problems here, if elections which took place recently will bring better times? Rhetoric question. I do not want to mention earthquakes we had, many fires in woods the last summers, heavy heat without rain/water for several months over summer and now for several weeks a lot of rain and cold weather, often streets are flooded and people are busy with water in their cellars. But let us focus on my absolutely favourite place here which is magic and special - Ostia Antica /Portus Romanus." ID 26370911, 6th Run

"About the 'conservation problems' link, I can only say we as population we're sorry too, but the Italian government is slow if it moves at all, corrupted all over and the more you go south the worst it gets. Ostia as well is under control of the government for

mafia, and Rome too until the recent elections of Virginia Raggi. I think the best way would be to cover the sites again, at least they're protected, and keep only open where excavations are still underway." ID 20012409, 5th Run

There are also some references to the Italian education system that, given the demographic of the learners, would be representative of schooling pre-90's:

"When I was a student, the main focus of attention of was paid to imperial Rome and Italian cities during the middle ages. Nobody was studying the age of transition, probably becaose of the difficulties in finding the correct information in text and archaeological excavations." ID 20119973, 5th Run

"…My grandfather, who was just a very simple taylor, knew Roman history pretty well (even if he had gone to school just for a few years), knew many legends and facts about Rome and was quite interested about monuments in general, even if he never took me to a museum. Point is that he was born in about 1890, so he couldn't be considered as "meaningful" nowadays." ID 14264099, 4th Run

"Average contemporary Roman is certainly very proud of his/her past, knows the Roman history learned at school, has possibly visited the Forum (with the school) but doesn't seem to be particularly involved with archeology. Of course there are many exceptions to this. I love archaeology, go to some exhibition but I don't think I've ever been to the "Musei Capitolini" (do not ask me why)." ID 14264099, 4th Run

The issue of the preservation of extensive cultural heritage was also extensively discussed. Despite recognising there are "a few organisations devoted to the preservation of cultural heritage" and some private initiatives like the restoration of the Colosseum, there was a strong self-critique on not doing enough to "educate people" or doing "too much talking". The Italian mindset of "If I can't/don't want to do it, you shouldn't either" was also seen as a problem, while the preservation of classic heritage in France and Greece was taken as an example.

Italian cultural practices are also really visible on the steps at the beginning of the course where learners are asked to imagine themselves on a boat arriving to the harbour. Most of the fifteen replied imagining the size of the buildings representing the greatness of the Roman empire with a mix of people and languages spoken, but they were enquiring where they could find "good food and wine" on their arrival, which is a representative element of Italian culture (Dickie, 2008; Bevilacqua, 2017; Cinotto, 2018). Only one mentioned the presence of slaves from different part of the Empire

and one suggested the need for a bath after a long travel and the interest in attending a gladiator game.

4.3.1.4 Feedbacks and physical site engagement

There is no data on the engagement of the Italian community with Flickr, however, there were three comments specifically on some of the resources introduced in the previous section. Out of three learners commenting on the Portus virtual tour, only one found it useful while revising. The others had a problem with the technology that did not allow them to see the images and the descriptions at the same time, and this frustrated them.

The only comments in Italian left on the Archaeology of Portus MOOC blog proved how the online resource was used by Italian learners and how the MOOC stimulated their curiosity, a theme that will be presented during the second case study :

"Salve, da quando ho iniziato piano piano mi sono talmente appassionato che vado a cercare su altre pagine informazioni riguardanti il sito di "Portus". queste ricerche fanno si che rimango indietro nelle lezioni, che vado a recuperare solo la domenica. Sarebbe interessante seguire dal vivo una lezione, lo prevedete? Se Si mi organizzo e vengo sul posto"

"Hi, since I started slowly, I have been so passionate that I am looking on other pages information about the site of Portus. These researches make me fall behind the lessons, which I can cach up with only on Sundays.it would be interesting to follow a face to face lesson. Do you plan to do one? If yes, I will organise myself and come on site." User 1, 11th June 2014.

In contrast to the other comments where learners expressed an interest in visiting the site, this underlines the need for some to have a blended approach.

Several learners expressed an interest in visiting the site as a result of the course:

"….I'm planning to go but I noticed that it is open only in May and June (Sat. & Sun.). Hope to make it on June 26th, otherwise I'll check if it will be open in September, as well. Did you go?... "ID 13653285 4 run

Or, they stated to have planned a visit with family members or with other learners, proving how the online platform also fosters personal links:

"…I am from Germany and working in Rome for a couple of years, I live only 7 km from Ostia Antica and will visit it again at this weekend (depite the weather:) with another very nice learner from the U.K., we did the course on Rome together last year…" ID 26221936, 6th Run

A few comments directly mentioned problems with subtitles during one of the runs that emphasised how much the Italian community has used them and how the downloadable transcripts helped in these occasions.

Overall, learners stated that they had "*no idea of how important technology is in archaeological work*" and found it really fascinating. Some of the comments provided feedback on how to improve the maps by adding additional legend items or on how 3D reconstruction could help explore the site virtually.

During the last two runs of the course, FutureLearn introduced a study group option. Several Italian learners stated that the study groups were good to share ideas and discuss a particular topic in-depth, but they could be intimidated, and it was challenging to follow conversations in the comments and in the groups.

One learner also commented on the peer education methodology that FutureLearn encourages and facilitates:

" I notice that the mentors leave space for peer education. It is a new way of teaching, more relations an discussions and less content despatched directly, more active behavior and less passive listening. The role mentor is provoking curiosity and giving us some links to find answer. Isn't it?" ID 14332581, 4th Run

This learner has clearly understood how the Archaeology of Portus MOOC was planned and facilitated, where collaborative communities of contributors provide the chance for institutions to be inspired while learning as part of a community (Perry and Beale, 2015; Chua et al., 2017)

4.4 Concluding thoughts

This chapter opens with a quote from a learner from the Italian community that successfully summarises the scope of the Portus MOOC. After having presented the structure of the course, both the English and Italian education systems and the opportunity offered by the latter in the previous section, this chapter focuses on the engagement occurring within Futurelearn and the externally linked platforms. Building on and extending previous research on topics such as quantitative learner analytics

(Zalinwska, 2018), I have focused my attention on qualitative engagement with the resources analysing comments, social media interactions and navigation through resources. In particular, the collaboration between Italian and UK institutions has always been at the heart of the Portus project and therefore, an understanding of how the Italian community engages with the resources should be used as a starting point for further improvements. For this reason, it was decided to offer the content translated into Italian starting with some of the key portions of the MOOC, after the first run, to the full content of the blog, transcripts and subtitles before the fourth run.

The availability of content in Italian has supported engagement, evidenced by the fact that some learners have made direct reference to the resources, used the translations or commented in Italian. Their documented interaction was with the Italian subtitles within FutureLearn and with the blog and Portus tour. Unfortunately, no data on downloads or use of subtitles is available to make a meaningful analysis of the effective use of such resources. It can also be assumed that learners taking part in the MOOC might have a higher level of English and that the translations and subtitles would not be suited to such a group. In line with the wider community, learners have also created a smaller virtual community "classroom" interested in heritage that meet virtually on other heritage MOOCs.

The Italian community, despite the small sample, appears to be quite knowledgeable about Roman content and really interested in the connection between the past and more current history. At the same time, it is quite critical for the current Italian system to open a space for deep reflection on the wider cultural setting. Archaeology and heritage are mostly presented in a romantic way in connection with personal stories and memories, and this is probably the result of the learning objectives set for the MOOC.

It is also clear that not many amongst the Italian community are familiar with the site, or even know about its existence, demonstrating the contribution of the course in increasing access and promoting cultural heritage literacy in geographically dispersed communities. However, it is possible that some that know the site and its history decided not to contribute or engage in the conversation, which created a bias in the responses.

The next two chapters will explore how some of the resources presented in this chapter can easily be reused in the Italian secondary school curriculum.

Chapter 5   Case Study 1: The Use of CLIL and Flipped Classroom Approaches

5.1 Case Study Background and Research Design

This chapter presents how the reflection on the information collected from the MOOC users and the changes introduce by the Italian legislation has been used to plan and define an intervention (Figure 59). This initial pilot involves a secondary school in Turin. The teacher leading the project took part in the Portus MOOC and expressed an interest initially through FutureLearn as described in the first chapter. This chapter will look at how the resources selected can be used to integrate into the traditional curriculum with Content and Language-Integrated Learning (CLIL) and a flipped classroom approach. While CLIL and flipped classroom methodologies have been applied before in the Italian context, the resources used are normally created in an ad hoc way. The innovation proposed exploring the repurposing of already existing material. Given the restriction of FutureLearn at the time of this first pilot, a different platform called Synote, developed by the University of Southampton, was explored and selected for this pilot. Students' preferences in terms of social media usage and knowledge of Roman history and English language were collected, analysed and interpreted using two separate online surveys to be completed at the start and at the end of the pilot. The information collected helped to understand how to best engage with the small student community and to collect feedback about their learning achievements.

In this chapter, I will therefore explore how this case study can address research questions 1, 2 and 3 and how outcomes from the previous section have informed the changes implemented in this first case study.
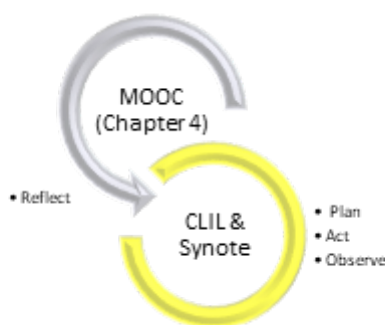
Figure 59 An image representing the action-reflection cycle applied in this chapter.

5.1.1 Content and Language Integrated learning theory

The popularity of the Content and Language-Integrated Learning (CLIL) methodology has increased all over Europe since its emergence in the mid-90s. CLIL is a dual-focused educational approach which consists of learning disciplinary content in a foreign language and therefore focuses at the same time on the development of language skills, without losing sight of the objectives and contents of a disciplinary nature. The starting point is the assumption that it is not possible to acquire knowledge and content without access to the language in which they are conveyed, mediated and evaluated (Pomerantz The four Cs framework is based on the use of culture, communication, content and cognition in a relevant context to provide the appropriate background to the development of CLIL activities in a given learning environment (Coyle et al., 2010).

According to Graddol (2006), a learner within a CLIL activity 'is not necessarily expected to have the English proficiency required to cope with the subject before beginning study', and this can contribute to positive engagement and motivation for students. Motivation is still the main driver to fulfil the learning objectives and the CLIL methodology and push students to learn and to communicate (Marsh, Marsland, and Stenberg, 2001).

The European Centre for Modern Languages (ECML) developed a programme of activities for 2004-2007, that included the 'CLIL Matrix'[136], a multidimensional framework built around content, language, integration and learning, that represent the core elements.

These four elements are achieved through parameters such as culture, communication, cognition and community. Teachers can use the 16 indicators resulting in this CLIL Matrix as a tool for self-awareness to monitor the quality of the teaching and learning. It also supports the teachers to identify the competencies needed to plan and implement effective CLIL activities.

Besides this, terms like soft and hard (or strong and weak) are used to describe, respectively, a language-led approach and a content-led approach (Kelly, 2010; Ball et al., 2015). Marsh and Wolf (2007) have described how a soft CLIL is more focused on the language aims while a hard CLIL is more suitable to the mutual learning of both language and specific knowledge. In this perspective, a hard CLIL better meets the requirements of multilingual contexts and programmes. This concept underscores the

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[136] http://archive.ecml.at/mtp2/CLILmatrix/EN/qMain.html

189

system of values and objectives characterising CLIL teaching: a specific subject-matter is favoured by the use of a foreign language, and the acquisition of a specific subject-matter competency is accompanied by an improvement in the field of language. In this research, I will consider a hard CLIL approach focusing on the content.

The teaching process is then focusing on the need to:

1.   integrate in a complementary way the teaching input with the subject teaching to stimulate cross-curriculum competencies (Serragiotto, 2011); and
2.   communicate content effectively in a factual, reliable while understandable way (Graaff et al., 2007).

In this perspective, Dalton-Puffer (2011) regards language and subject-matter as two faces of the same coin, being that one legitimates the use and function of the other.

In their studies, O'Malley and Chamot (1990) point out the metalinguistic and metacognitive value of CLIL in activating a process that stimulates the micro linguistic dynamics emerging in class and thus supporting a new attitude and communicational behaviour based on the real skill of using a foreign language to deepen non-linguistic content. For this reason, Lasagabaster and Serra (2009) and Li (2002) believe CLIL's best application is in an educational system that defines culture as a multidimensional structure that combines a series of fundamental values meant to prepare a particular social group to face the challenges of a global environment.

Studies conducted by Coonan (2007; 2008) and Coyle et al. (2010) have highlighted the orientation and commitment undertaken programmatically by the European Council since the early '90s to spread the acquisition of foreign languages to the adoption of CLIL in programmatic protocols within many European institutions, including Italy. Bower (2017), illustrates some of the concerns on the small number of English schools that are using CLIL methodology at secondary school level that is probably connected to the British Governament's decision to make languages optional for students aged 14-16 (Key stage 4) and the absence of a CLIL national policy (Bower et al, 2020: 6).

While in England, only one typology of a CLIL pilot project was developed to be run at the primary and secondary level with schools and teachers taking risks with curriculum innovation (Bower, 2019) and have embed it in the curriculum (Bower, 2017b, Coyle 2011), over a hundred different projects have been launched in Italy since the '90s across all levels of education (Eurydice, 2006: 33). Due to the autonomy given to the schools, the subjects involved in the pilots vary quite remarkably. Subjects like the sciences, art, geography and technology at the lower level and moving to history,

biology, ecology, economics and sciences at the secondary level are a part of the pilots in Italy while geography, history, sciences, social and health education are part of the CLIL projects in England (Eurydice, 2006: 38).

According to studies by De Meo (2015) and Cinganotto (2016), the incremental importance given to CLIL in the scholastic and university pedagogy in Italy shows not only the support received from legislators but also they believe from educators that CLIL plays an essential role as added value to the acquisition of a foreign language skills.

Numerous experiences in CLIL have enriched the Italian scenario in recent years (Coonan, 2005; 2007; 2008; 2011; 2012; Ricci Garotti, 2007; Sisti, 2012; Bosisio, 2015) using it as a model for language education, while developing innovative ways to establish different degrees of proficiency and configuring a more substantial level of learning. The curricular projects developed by many scholastic institutions feature innovative pathways to reflect different teaching contexts and the quality of the issues raised in class, therefore guaranteeing students more authenticity to their time and efforts spent in class and more opportunities for an exchange of knowledge in a foreign language. In Italy, therefore, what has taken place is a great cultural change as to how foreign languages are taught as the measures put in place are aimed at producing methodological guidelines for the realisation of CLIL so that the experience in class responds to a teaching model of reference without resorting to improvisation when dealing with language-content learning (Ball et al., 2015).

In Italy, this type of experience is set within a standardised framework where the institutional CLIL as indicted with the Presidential Decree for High School reform n.87-89/2010, is a reduced version of the proper CLIL. The difference is based on financial possibilities that might limit the effectiveness of the methodology (Cinganotto, 2016). The legislation stated that the teaching of a non-linguistic subject in a foreign language is introduced at grade 13 of high and technical schools, and into the last three years (grades 11-13) of the linguistic high schools. A subject is therefore taught entirely in a foreign language, and this is carried out by the subject teacher who, in order to activate and develop a CLIL stream in class, needs to have a certified language competence equal to C1 of the European Framework. In order to facilitate the transition to a full implementation of the framework, teachers are initially allowed to carry out only 50% of the programme in a second language.

La Buona Scuola attempted to spread the vehicular methodology though in many sectors of the educational system, especially in the bilingual German-Italian school of

the autonomous province of Trento. For school years 2015-16 and 2016-17, the Italian Ministry of Education committed to financing CLIL projects through every scholastic level in order to innovate teaching methodologies and create a learning environment that is more attractive and more laboratory-oriented. In addition, CLIL's increased priority was also included in the National Teachers Training Plan approved in 2016 with the creation of refresher courses for teachers so that might be able to devise a more effective strategy and solutions to learn language and content within CLIL. These changes have allowed CLIL to spread better across the Italian territories (Trentino, Aosta valley, and Friuli Venezia Giulia) where plurilingualism is already radicated.

Two methods of CLIL have been identified in Italy: a "bottom-up" one led by language and subject teachers working together and based on their initiative and relying on their knowledge and expertise, contraposed to the "top-down" method imposed by the legislation (Lucietto, 2009; Coonan, 2011; Sisti, 2012; Bosisio, 2015).

It has often been reported that in subject matter teachers cannot count on having that level of language competence to deliver the content foreseen by their discipline in the foreign language of choice. This implies that such teachers are not fluent in that language and are unable to provide in-depth and targeted information on the subject topic, they might be in a difficult situation where the students might have a higher language level than the teacher. In 2018, Turin hosted the first Italian conference on data-driven learning and CLIL aimed to disseminate good corpus-based teaching practices among foreign languages and subject specific teachers involved in CLIL; despite the interest shown by the large audience present, the proposals presented were not followed up in concrete classroom teaching projects (Corino, 2020). Among the critical points identified by teachers there is certainly the technological aspect, as already observed by many studies in the field (Mukherjee 2004; Römer 2009; Tribble 2015, Leńko-Szymańska 2017): on the one hand of a legitimate but merely logistical objection, linked to the equipment available in schools, on the other a lack of specific training for teachers who are not only unfamiliar with the content of the curriculum, English language skills and ICT (Internet and Communication Technologies) related to it, but, above all, they lack specific skills on how to educate the resources at their disposal (see for example some of the results reported in Scheffer-Lacroix 2020). It is clear that the linguistic standard offered by the teachers to their students may be inadequate as, on one hand, it might represent an impediment to the understanding of the content and, on the other, it misrepresents the linguistic model that higher levels of education aim for as it requires higher level of language fluency (Sylvén, 2013).

The contribution of this research, and in particular the first pilot, is in filling this gap by providing teachers with resources that can be flexibly adapted to the curriculum and utilised in a user-friendly environment that does not requires extensive IT support.

Once the CLIL methodology was defined, I explored alternative possible ways to make the video and transcripts in multiple languages available to students as FutureLearn did not support this specific functionality at the time. Synote, a software developed by the University of Southampton, was explored as an alternative to FutureLearn for the first pilot.

5.2 The Development of Synote as an Alternative to FutureLearn

Synote, which stands for Synchronised Annotation, is a web-based multimedia annotation tool, created by researchers at the University of Southampton in 2008, that aimed to make videos easier to interact with and learn from.

Synote (Wald et al. 2009) was initially developed to overcome the problem experienced by users that would like to easily find their associated notes or resources associated with a part of a podcast or video recording that they have bookmarked, searched, linked to or tagged. (Whittaker et al., 1994).

At an initial presentation in 2010 (Wald, 2010), Wald illustrated the potential of the software in supporting students' learning by allowing feedback, created live or after the event, and questions to be connected to the appropriate moment on a recorded lecture.

The system, that was described by the European University Information Systems (EUNIS) International E-learning Award panel as the most exciting educational innovation they had seen for many years, automatically or manually creates and synchronises speech transcriptions, allowing teachers and students to create real-time synchronised notes or tags, and facilitates the capture and replay of recordings in any media format and browser, and can be stored anywhere on the web.
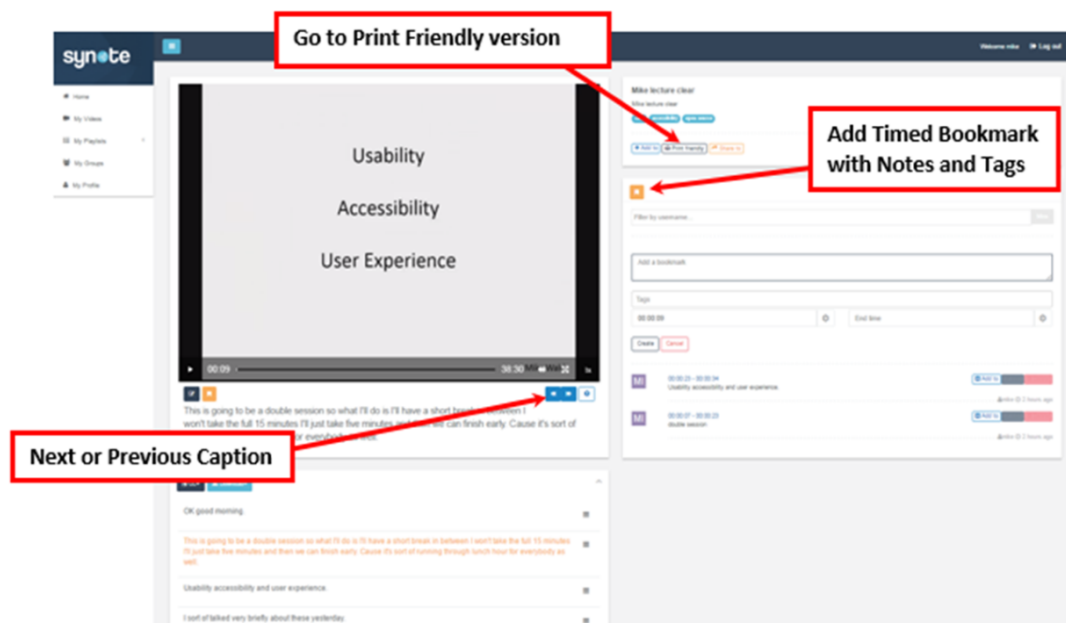
Figure 60 A Synote screen capture showing some more features of video replay and caption editing (image from Wald, 2018b).

Synote's interactive transcript allows viewers to search for videos for any word or phrase and replay the video from that point onwards. Students can then print out screenshots with the corresponding transcript and notes. The synchronised bookmarks, containing notes, tags and links are called Synmarks. When the recording is replayed, the currently spoken words are shown highlighted in the transcript. The software has benefitted from Jisc and Net4Voice involvement and user's involvement to improve the general experience (Wald, 2018a).

This web application was selected to be used as alternative to the FutureLearn platform because it is a low-cost and efficient system for the creation of synchronised notes, bookmarks, tags, images and text captions. The system (Figure 61) was also guaranteeing anonymity as students were registered with a personal alias known only to myself and the teacher. This was to allow pupils to post and interact with the platform without any fear of being judged by other students.
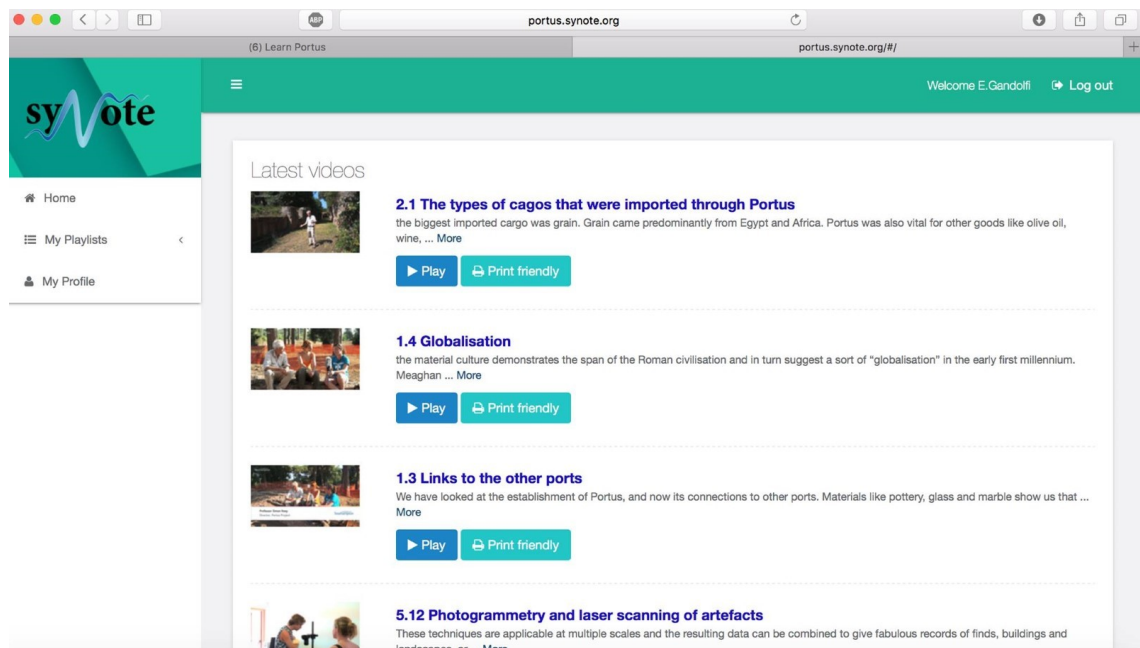
Figure 61 A Synote screen capture of the videos included for pilot one.

Students were empowered to annotate videos and share comments in a protected environment due to the age of some of the participants. It also allowed visualising subtitles in multiple languages for each video, a functionality not available on FutureLearn at the time of the study.

5.3 Survey design and method of analysis

A survey is a common method used to receive a snapshot of reported views or perspective from users (Marshall and Rossman, 2010). According to how questions and answers are designed, quantitative or qualitative information can be drawn.

If free-text responses to survey questions are collected from participants, qualitative analysis can be performed to surface themes and issues that the respondent sees as important in shaping the ways they interact with a platform. There are many advantages of using an online survey, including the following:

1. Access. Especially if there is an easy way to send out messages to all potential participants such as using a mass email containing a link to a survey online, it is likely relatively easy to at least provide participants with the capacity to respond to a survey with little effort to the researcher beyond developing the survey questions.

2. Time and flexible research. Survey responses collected online through an online survey are easily and immediately accessible online in a digital format,

allowing for data analysis to begin simultaneously with continuing data elicitation.

It was decided to conduct a survey at the beginning of the project and at the end, to profile the students and understand the evolution of their behaviours.

5.3.1 Survey Aims

1. To collect, describe and compare evidence of Italian students' attitude towards the study of heritage contents.
2. To identify patterns emerging in the study and on the consumption of heritage content amongst Italian teenagers.
3. To determine whether the methodology proposed adds value to the traditional teaching methods.
4. To provide qualitative evidence on the effectiveness of the methodology in developing heritage knowledge and interest in visiting the site.

5.3.2 Questions design

To provide a comprehensive profile of the students' background and to test their pre-existing knowledge of Roman world, a survey was designed to be broad in scope, but with set boundaries. Only students in the class taking part in the pilot were invited to fill the survey.

The questionnaire to be completed at the beginning of the data collection was formed by 20 closed answer questions divided into different sections to collect information on student profile (e.g. origin, social media usage), ways of consuming heritage (e.g. site visit, museum visit, documentary), and a knowledge self-assessment (e.g. language level, knowledge of history). The online survey opened with a written introduction to (Peterson, 2000) encourage students to complete the survey and to establish informed consent. It also included a combination of open and multiple-choice questions to keep students engaged (Bell and Water 2014: 159; Desconbe, 2014: 176), and rating scales to measure students' attitude (Likert, 1932) were integrated through open-ended tasks as detailed in Appendix B. Answering all the questions was a compulsory part of the pilots and the teacher had a preview of the questionnaire before the start of the project.

Accuracy can be an issue in questionnaires like the one designed where respondents are self-reporting information about their pre-existing knowledge of English and Roman history. To minimise the bias, I restricted the survey to collect basic demographic and

social media usage information, leaving more details on their feedback, impressions and personal experiences. The fact that students are self-selecting and independently answering to the questions increases the risk of survey bias, but it was ultimately unavoidable at the initial stage of creating engagement in the pilot.

A similar questionnaire was taken at the end of the project (Appendix B). In this case, questions were developed across the following sessions: student profile, knowledge self-assessment and an opportunity to share any feedback. Students were asked to reply to some of the same questions in the pre-learn Portus questionnaire to identify any progress, while open questions were designed to obtain constructive feedback.

Both questionnaires were piloted by the teacher before the start of the pilot using iSurvey, the University of Southampton survey platform. The pilot survey was also reviewed by the school teacher, whose feedback helped to ensure the questions did not contain unknown terms to the class that might have caused unreliable data to be collected.

5.4 Survey Data collection

The survey was divided into two stages: pre- and post-engagement. The pre-start survey aimed to collect information to develop a better engagement amongst the group and remained open for a week prior to the start of the pilot. It was hosted on the University of Southampton iSurvey website, opening with a brief bilingual (Italian and English) description of the research, contact details, and consent declaration. Students were invited by the teacher who circulated the link to the online survey to the class.

This survey was originally approved by the University of Southampton Ethics Committee (n. 17842), and all research participants gave their consent prior to taking part in the pilot. Students' families were also informed as Italian law requires permission from parents for school activities involving underage pupils, and parents also gave their consent directly to the school.

In compliance with the University of Southampton policy on data collection and the Data Protection Act (1998), the data collected, and their analyses, are backed up on password protected off line external hard drives, and intended for the purpose of this study only. Students' information has been anonymised and any identifying information obscured during analyses and writing.

The data collected was firstly exported and mainly visualised with histograms to better identify patterns allowing a comparison between data pre- and post-pilots and between the two different pilots. The following summary is not exhaustive of the survey findings and some comparison will continue in Chapter Six, Section 6.5

5.5 Collaborating with the School in Practice

The initial data collection involved 29 students from the class IV L at the *Liceo Classico Statale Gioberti*[137] in Turin with the Portus MOOC facilitating the initial contact between the author and Professor Maria Luisa Genta, teacher of Italian and Latin Literature, who followed the course. The school is prestigious and located in the centre of Turin and only present 10% of students born outside the italian territory.

As described in the introduction of this thesis, Professor Genta initial comment on the FutureLearn platform contributed to the development of this first pilot as a way to test how the content could be used to integrate the italian school curriculum. In her first messages, Professor Genta expressed an interested in working with the content using a CLIL methodology, but was aware of the limitations in opportunites as this is an approached that is usually led by the teacher of a foreign language:

"…. My aim is to structure activities referring more or less to the CLIL methodology although I can't work with my students using this method because I am a teacher of linguistic subjects (Italian and Latin at a secondary school specializing in classical studies and in modern foreign languages)..."

Following an initial online meeting where the scope of the collaboration was discussed, the teacher agreed to participate in the project. Professor Genta was keen to use some of the content from the Archaeology of Portus MOOC to raise the quality of educational parthway offered by the school in line with the requirement of the Italian education sytem introduced in Capter 3.

All contacts with the teachers happened virtually with emails being the preferred way of communication during the set up phase. A face to face meeting with the teacher in

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[137] The origins of the high school "Vincenzo Gioberti" reside in the Royal College of San Francesco da Paola, founded in the ancient monastery complex of the Friars Minor, built from 1627 in Contrada di Po in Turin thanks to the donations of Maria Cristina of Bourbon-France, wife of Vittorio Amedeo I of Savoy, and directed since 1821 by the Jesuits. It was established on March 4, 1865, was among the first 68 classical high schools of the Kingdom of Italy and it was the most frequented of the whole Kingdom for many years. It was named after the Italian philosopher and politician Vincenzo Gioberti, among the most important figures of the *Risorgimento.*

Turin happen at the end of the pilot to assess the success and discuss a possible re-run of the project. Unfortunately, Professor Genta took an early retirement and left the school before the new academic year started. An attempt to run the project with the English language teacher was made, but unfortunately other plans were already made for that subject.

5.6 Methodology

As first step, some of the Portus MOOC videos were selected by myself and divided into five thematic pathways identified with Professor Genta as areas that intersect with the Italian Latin literature programme of study approved by the Minister of Education:

1. Buildings (Palazzo Imperiale, Magazzini di Settimio Severo and Terme della Lanterna)
2. Phases (Claudian, Trajanic and Severan)
3. Excavation and Discoveries (Pottery, coins, Portus Head)
4. Computer Graphic & Reconstructions (3d Modelling, Photogrammetry)
5. Rome's Trade Network (Globalisation, Imperial Rome port system, goods traded)

In partnership with the school teacher, the project looked at two main areas:

a. Pedagogy, focusing on the type of information learned by the students
b. Archaeological knowledge acquired, e.g. developing an understanding of modern relevance of the site, knowledge or archaeological methodologies applied to excavations, knowledge of the site history and evolution, knowledge of local community involvement/activity /relationship with the site and knowledge of economic and cultural importance of the site

Selected videos and bilingual subtitles were made accessible to the students in Synote with a brief introduction to the content of the video. Additional interaction with students was originally planned on Twitter in an attempt to engage the Italian community in that medium.

The data collection started at the beginning of March 2016 and terminated at the end of May 2016. Participants were asked to complete an initial survey (Appendix B1) as illustrated in 4.3. Results from the survey showed that students did not have a Twitter account and were not using it regularly. This data forced a reflection on the

effectiveness of engagements planned on a platform that is not normally used. The creation of a private Facebook group to interact with students was then implemented.

After having completed the survey, students received a personalised email with information on how to access Synote and an invite to join a restricted Facebook group to interact with me as they would have done within FutureLearn. Students then watched all videos at home and were asked to annotate the videos in Synote and identify relationships between what they were watching in English and their pre-existing knowledge. All comments are designed to be anonymous, and only the author and the teachers knew the identity of the participant, to ensure any abusive comments could be moderated and stopped immediately.

Students were then asked to watch the videos at home and discussion, and group work took place at school following the flipped classroom methodology. The flipped classroom is a pedagogical model in which the typical lecture and homework elements of a course are reversed. Videos are viewed by students at home before the class session, while in-class time is devoted to exercises, projects, or discussions. (Låg and Grøm, 2019). It is considered as an active learning methodology as it engages students during their learning process (Bishop and Verleger, 2013).

While the terminology 'flipped classroom' is relatively new (Berrett, 2012), the pedagogical approach is not and has been known in the past as inverted classroom (Lage et al, 2000), or inverted learning (Davis, 2013). This approach has revealed positive, or at least neutral, on academic performance and satisfaction with the experience (Chen, Hwang & Lai, 2020; Galindo-Domínguez, 2018; Lag & Grøm, 2019). However, recent studies have discussed how positive performance is directly affected by student engagement and commitment as much as the availability of digital resources that could support the individual study time (Galindo-Domínguez, 2021). It was agreed that all comments and interactions on the shared platform would be in English following the CLIL methodology.

Participants were also invited to interact via social media, sharing pictures of similar artefacts or buildings, sharing sources and producing 3D models in SketchUp and/or 123D Catch. In this initial pilot, students were invited to reflect on the use of visualisation in archaeology as a public engagement (Haynes, 2017) and as a research tool (Earl, 2013; Nicholls, 2016; 2019). Minimal support on 3D modelling was provided, directing student to the freely available tutorials on YouTube or on SketchUp websites. Students were also invited to complete a final questionnaire (Appendix B2) to monitor progress and test acquired skills.

5.7 Survey findings

5.7.1   Student profile

The survey showed that the majority of the students' families are originally from the city where their school is located, in this case, Turin (Figure 62). The class has students with family from different Italian regions and from a different countries. On one occasion, a student had English as a first language and would have been able to help the other students to improve their English. This question was included to have additional information on connections between the students and the local heritage explored on a later question, and with Roman history in general.
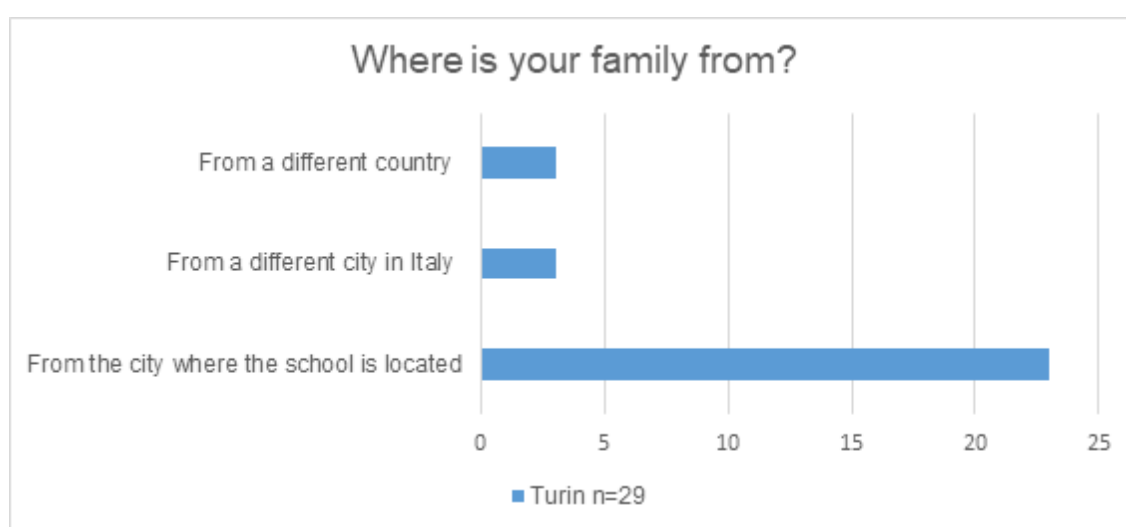
Figure 62 The graph shows the origin of the students' family participating in the first pilot to determine any direct link to the local community.

The results confirmed that the majority of the students are frequent users of social media, with eighteen of them using it more than once a day, with WhatsApp and Facebook being the most used (Figure 63).
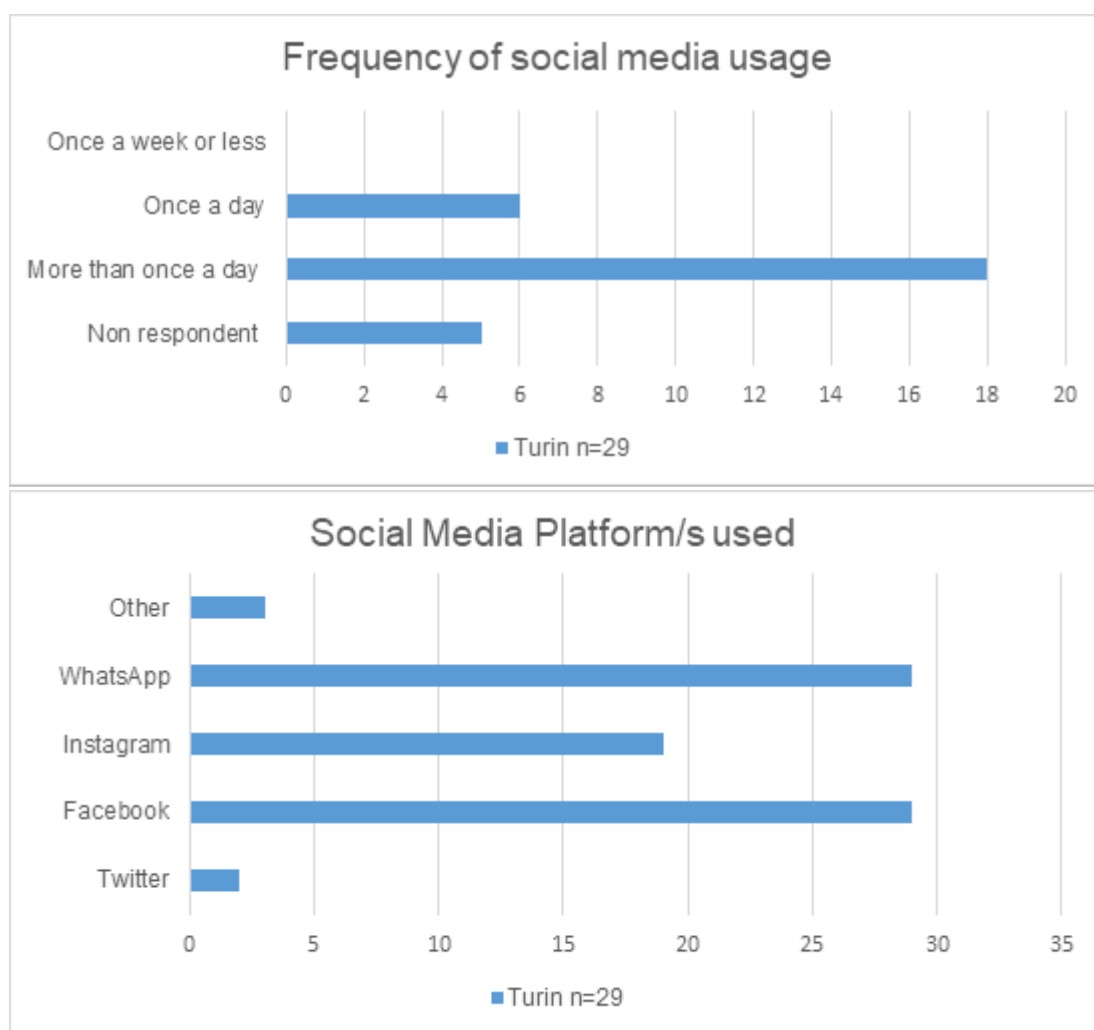
Figure 63 The graph on the top shows the frequency of social media usage amongst the students surveyed, while the one on the bottom shows the preferred social media platforms utilised.

This section has been instrumental in understanding the background and habits of the students taking part in the project, and the final aim is to design an effective engagement strategy. The result is in line with the information collected from the Observatory on Adolescent Communication between Real and Virtual (OSCARV) on secondary school students of Bergamo and its province, with the aim of investigating ways, places and timing of the use of electronic communications. The Observatory's investigations were born in 2008 with the aim of putting under the magnifying glass the behaviours between real and virtual life of adolescents (Lazzari and Jacono Quarantino, 2010), meaning the term high school students. In this sense, boys between the ages of 14 and 19 who had left school and were not included, and those of a lower age were excluded from the analysis. Over time it has become clear that the dissemination of the digital tools in the age group of middle school students is not remarkable and therefore starting from the second survey campaign of the

Observatory, held in 2012 (Lazzari, and Jacono Quarantino, 2013), a reflection was opened on their uses and related netiquette (De Fiori, and Lazzari, 2013; Lazzari, 2015).

As in high schools, WhatsApp is the instrument that has prevailed most in the use of preadolescents; in this age group, more than among the older companions, the use of Instagram is also remarkable, while that of Facebook is slightly compressed (see Table 17 below for the data on the frequency of use declared for the primary services taken in consideration: for space-saving reasons, the social data less relevant for the sample are not reported).

The three types of data taken together can be interpreted in this way: I use WhatsApp when I have something to say to someone (the single or the small group), Instagram when I want to share an experience with the suddenness of visual communication, and Facebook when I want to spread a reflection. The immediacy of image sharing means that Instagram in this age group is preferred to Facebook, which is more demanding and not by chance used more in high schools.

	Ask.fm	Facebook	Facebook messenger	Instagram	Snapchat	Twitter	WhatsApp
Never	76.6%	55.9%	64.3%	30.5%	81.2%	75.2%	8.7%
Sometimes	11.0%	17.1%	13.3%	10.2%	7.4%	12.9%	4.2%
Often	4.4%	10.8%	9.6%	12.4%	4.2%	5.5%	8.7%
Every Day	8.0%	16.1%	12.7%	47.0%	7.2%	6.3%	78.5%

Table 17 This table shows the results of the survey conducted in a school in Bergamo (Data from Lazzari, 2015).

Compared to Facebook, it can be noted that 55.9% who declare that they never use it correspond to 56.3%, which three years earlier declared that they had not activated their account; 16.1% of those who use it every day, added to 6.3% of Twitter, corresponds to 20% of those who three years ago declared to use a social network every day (the question indicated "Facebook, Twitter or other", but at the time the other option was really marginal). It can be deduced that the traditional services remained stable in the choices, while Instagram and messaging services have been adopted, bringing together in this success Facebook Messenger to WhatsApp also.

5.7.2   The consumption of heritage

This section of the survey was designed to gain an understanding of students' consumption of heritage.

Only one third of all the students (3 out of 12) confirmed they have watched a documentary or a TV programme about Roman history and archaeology, visited a site or learned online, however data from the survey suggests schoolbooks are still used as a principle source of learning (Figure 64).

Figure 64 The graph shows how students taking part to the project normally learn about history and archaeology.

In relation to the question related to visits to the site, the two groups gave different replies: the majority of the students in Turin (17 out of 29) and a minority in Milan (4 out of 12) confirmed that they had visited Rome, with the Colosseum and the historical city as main attraction. Only one out of the entire sample had visited Ostia before. It also emerged that the majority of them have visited a museum in Turin, but only a few knew local community groups organising historical events or had taken part in a historical event (Figure 65).

Therefore, the students were familiar with museums and traditional engagement with history via books, documentaries and museums but were not linked to active communities in the region. This represents an important insight to better understand the connection and active participation of the community of Fiumicino in their region.
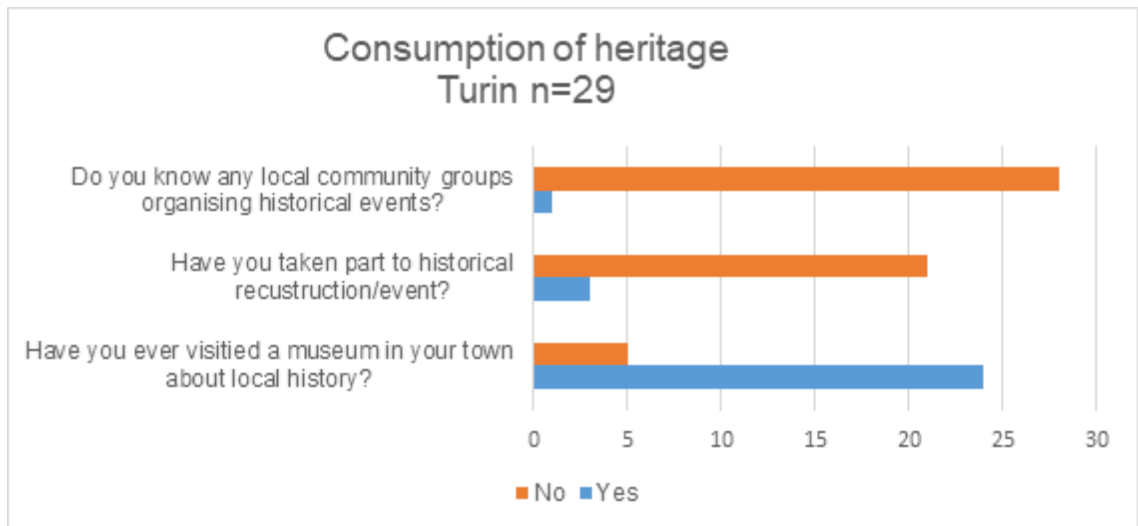
Figure 65 This graph shows how students from the school in Turin engage with heritage in their local area.

One of the questions was included to gather data on students' pre-existing knowledge of the site. Figure 66 shows that the majority of the students have never heard about Portus before. Three students that have positively responded to this question have indicated their teacher mentioned Portus during her classes. It could be possible that the other eight students have been equally influenced, showing the class had no pre-existing knowledge of the site.
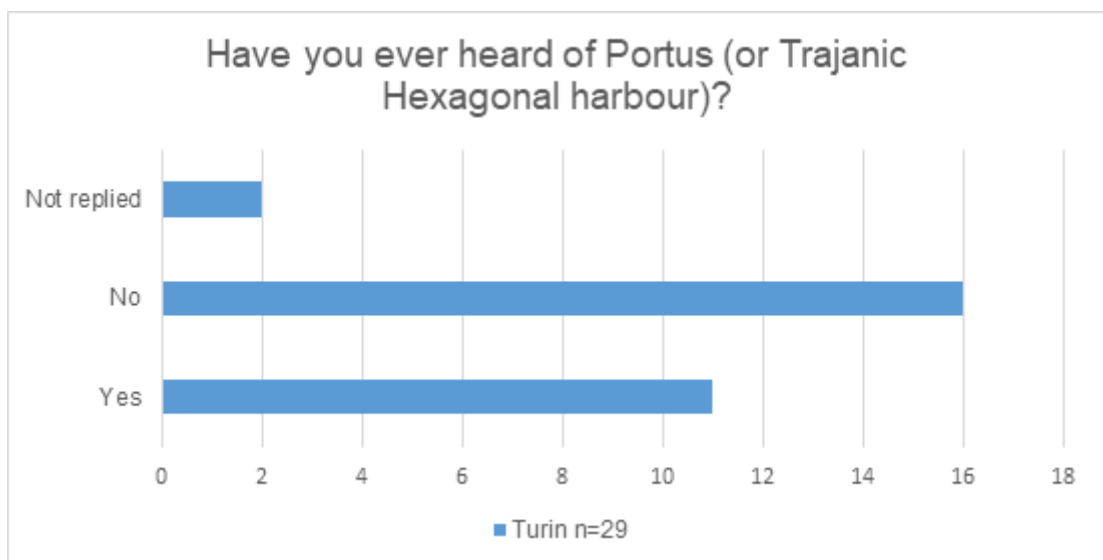
Figure 66 This graph shows the number of students that have heard of Portus before taking part in the MOOC.

5.8 Problems encountered and reflections

In the first round of this project, some difficulties emerged that could be summarised in the engagement of Synote and with the social media platform used.

5.8.1 Synote Engagement

Synote has been successfully used by students at the University of Southampton to support their learning in preparation for exams where they use all of the tools provided to annotate videos of their lectures (Wald, 2018a, 2018b).

However, Italian students have used the application only as a video repository and have not used it to its full potential. One possible explanation of this behaviour is that they are not used to technologies like this in the classroom and might not have had enough time to become familiar with it as the project lasted less than three months. Some students experienced some initial challenges accessing the platform that might have compromised their wider experience.

In addition, teenage students have not had any support in the classroom that could have helped them or shown them all functionalities directly, as it would have been possible with students in Southampton. Support was offered by the author in English via social media and email, but this might have represented a barrier to some.

5.8.2 Social Media Interaction

At the start of the project, the author planned to interact with the class on Twitter. This would have facilitated interaction between the Italian students and the students following the Portus MOOC running at the same time. However, data from the survey showed that only two students were already using Twitter. It was then decided to move the social media interaction onto Facebook as everyone (except for one student who did not declare it in the survey) had an account that they used regularly.

A closed Facebook group was then created and used during the data collection. Despite the fact they have not been able to interact with learners taking part to the Archaeology of Portus MOOC, they have been able to actively share any regular posts, comments and 3D models created (Figure 67).
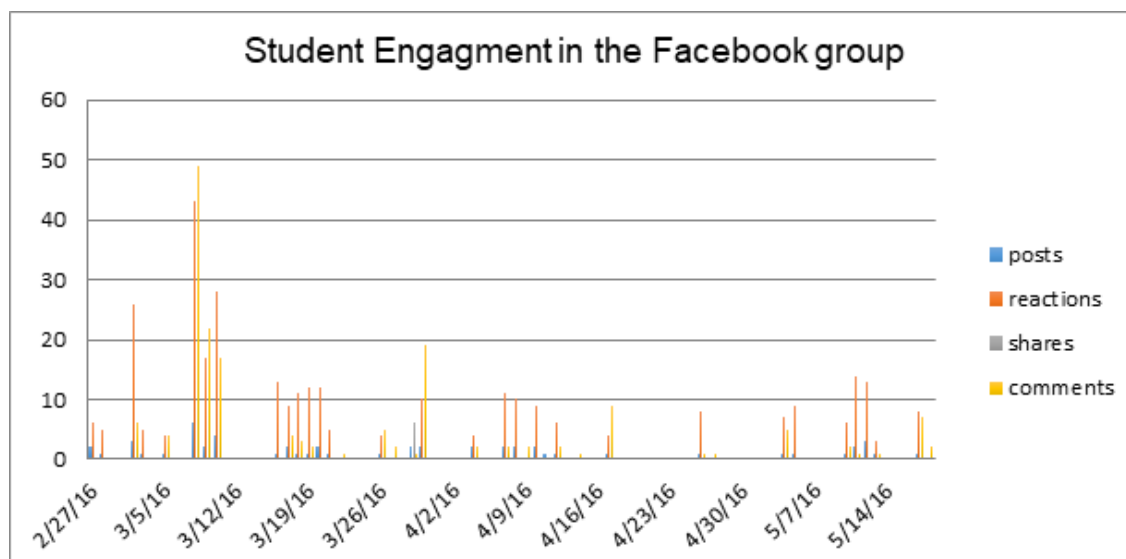
Figure 67 A graph showing engagement of the students in the Facebook group.

Students initially needed some prompting to interact, and I have proactively invited them to share their impression with sentences like "*So, you should all have watched a couple of the videos, what do you think? Have you find it easy to understand?*" and "*This week we had a look at images, what about this (link to the "build your Portus info sheet")? It's still a 3d model! What do you think about this? You can also use the measurements to build your own 3d model in Sketch up*!". This approach replicates the tone and interactions used on the FutureLearn MOOC to prompt discussions. Pupils have then started to interact and share their comments on the videos:

"They are very interesting and easy to understand using english subtitles! The web site charges the videos slowly, but you can see them, anyway." Student 1.

"I liked seeing these videos because it's interesting to understand better the different phases of the Roman Empire and how it was connected with the others cities!" Student 2

"I think they're interesting too and very easy to understand, the fact they're short helps a lot to concentrate and to catch the key points" Student 3

When asked to explore 3d modelling using SketchUp, students have started experimenting with the software with no external support, using only tutorials available online and shared their models with the group. Similarly to the methodology applied by Nicholls (2019), students have been exposed to the historical context of the site and visualisation in archaeology, before attempting building their own model based on the data and information provides. Their initial ambition of building something that look realistic, has however clashed with the reality of learning a new software with limited

207

support and in a short timeframe, while dealing with complex structures and data. Despite all the challenges, students have found the process fun as described by Nicholls (2016):

"This is how a 3d reconstruction looks like!!! (Figure 68) It's a very simple house but you could do more complicated structures. I gotta say that it's pretty fun, too!!!" Student 4
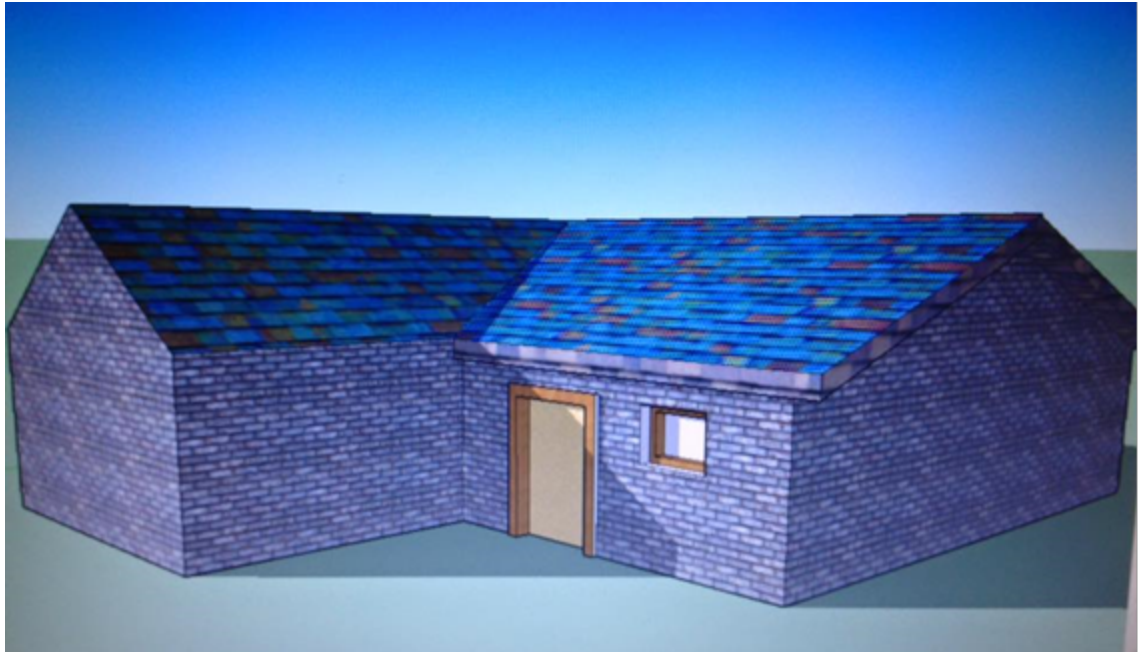
Figure 68 Reconstruction created by Student 4 in SketchUp.

While student 5 was not of the same opinion: "*Hi Also I, like student 4, I created my 3d reconstruction. It should be a house with a garage and a pool. I know that is not very cool, but it wasn't easy.I enjoyed learning to use SketchUp!"* (Figure 69)
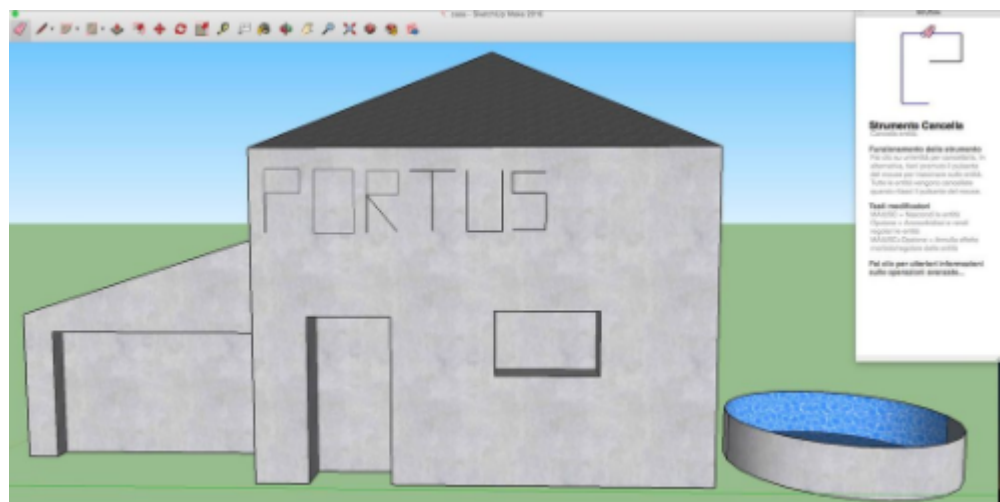
Figure 69 Reconstruction created by Student 5 in SketchUp

Only one pupils has created her own interpretation of one of the building studied during the pilot: *"Hi! "At the end of this project I've tried to create a 3d reconstruction using SketchUp (Figure 70). In my opinion, it was really difficult to use it and the all reconstruction took a long time because I had to work on every details. But finally, I succeeded in doing it with some help and now I'm really satisfied with the result. The source of inspiration was the image that represents the Magazzini of Settimio Severo. I think that this project was really useful to learn new things about history in a different and modern way. I hope you'll like my reconstruction "*
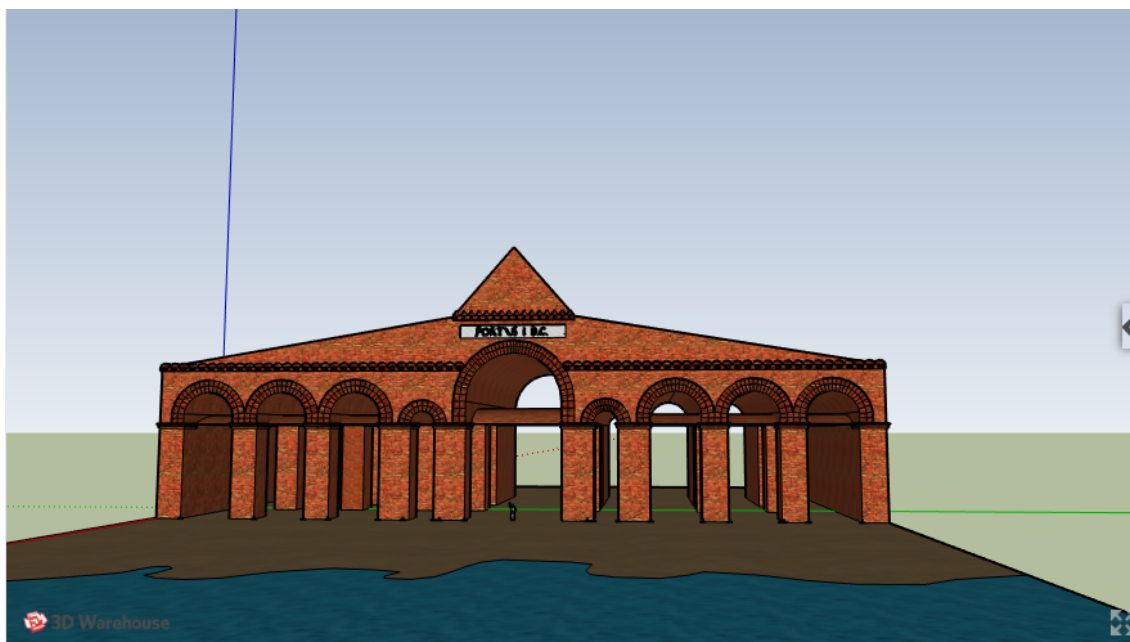
Figure 70 Reconstruction inspired by the Magazzini of Settimio Severo in SketchUp by Student 6[138]

The comments associated to the image of their model functioned as 'footnotes' to the model (Nicholls, 2019: 140) where students were invited to reflect on their experience using the software briefly describing the outcome, challenges and opportunities. The use of comments on social media was used once again to replicate the experience on a platform like FutureLearn.

The model shared was the upload to SketchUp warehouse to increase accessibility and enhance reusability of the model.

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[138] Reconstruction available https://3dwarehouse.sketchup.com/model/c8db403d-6ab8-48d6-a086-668b73635f53/Building-5-Portus-Fiumicino

5.8.3   Self-assessment of knowledge and suggestions for improvement

The survey included questions related to the perceived level of knowledge about Roman history and confidence in using the English language in the classroom. Students were asked to rate these on a scale between 1 and 10 at the beginning and at the end of the project.

Despite the lack of information from seven students that have not completed the second survey Figure 71, and Figure 72 show an increase in confidence from the students. Students feel more knowledgeable about the Roman world and more confident in using English in the classroom. The data was confirmed by the teacher that stated an improvement on students' confidence and knowledge in the classroom. Unfortunately, quantitative data based on a targeted marked assessment were not included in the pilot and have not been collected.
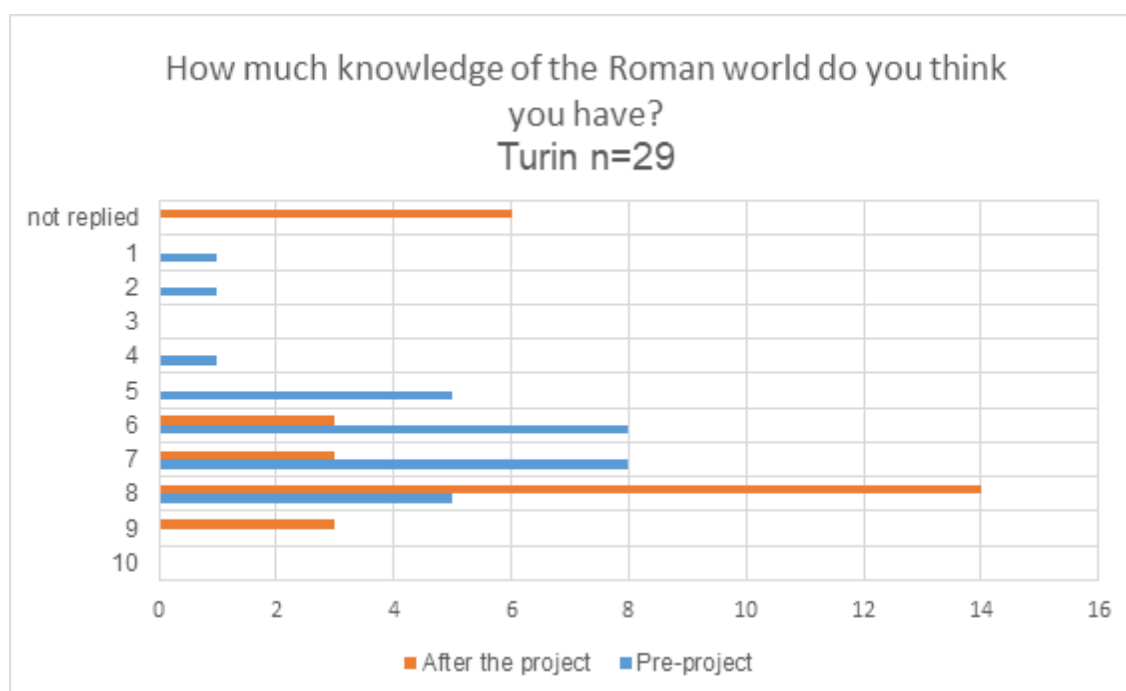
Figure 71 This graph shows data of perceived knowledge about the Roman world by the students in Turin.
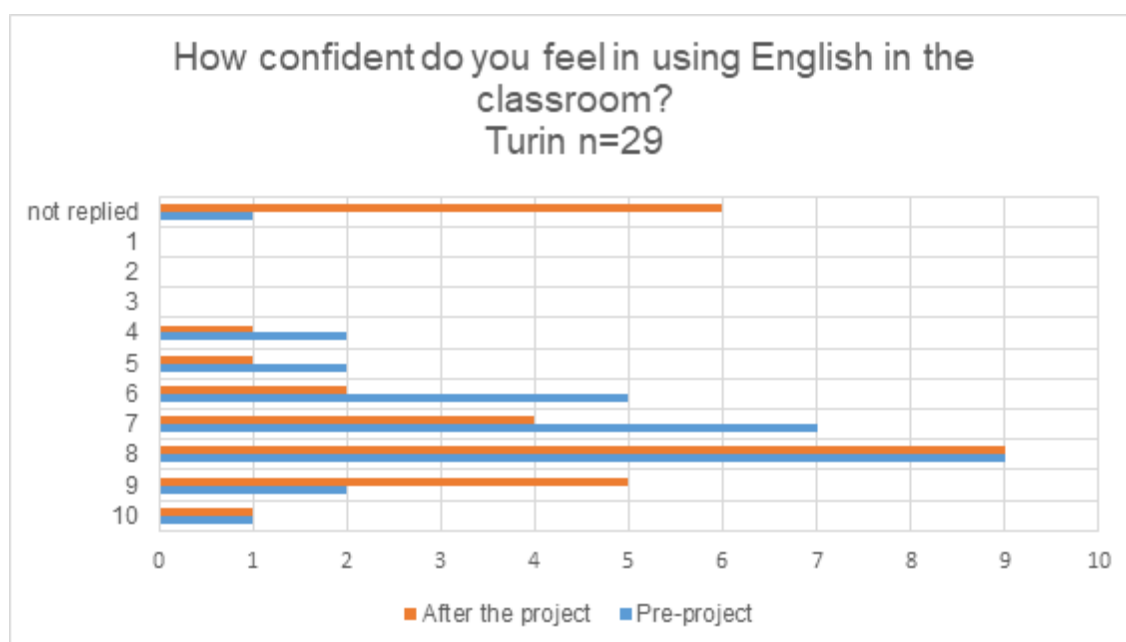
Figure 72 This graph shows data on how confident the students feel in using English in the classroom.

5.9 Concluding thoughts

In this first case study, the teacher acts as a "facilitator" and guide, assisting the students in their own linguistic and cultural development replying to the first research question (*Can Massive Online Open Courses (MOOCs) with a heritage focus be used effectively within compulsory secondary education using Content and Language Integrated Learning (CLIL) and blended learning?*). Facilitation can be implemented by a suggestion, a clue, or an encouragement; to guide is to offer an explicit explanation of a strategy of learning, bringing to mind a grammatical rule (Oxford 1997: 448). When this aid takes the form of coordinated and targeted actions that are implemented by the teacher or by a more experienced peer, they gradually support the learning process through "scaffolding", which can be progressively subtracted with the increase of the student's ability to learn independently. Despite the encouraging data, students have expressed emerging difficulties during their engagement with the Synote platform.

The issues experienced were mainly connected with the limited time available to students to become familiar with it and fully appreciate all functionalities offered. Feedback received led to the development of a Portus portal (www.cloudtour.tv/portus) on a CloudTour platform that was used on the second pilot presented in Chapter 6.

Results from the online surveys have addressed the second research question (*Can such Heritage MOOCs* increase access to education content amongst secondary

school students?), where students have demonstrated to have increased their knowledge of Roman history and methodologies used by the project. The use of visualisation and 3D models as a pedagogical tool, has deepened and widened student's previous knowledge of the place while providing a new perspective and a scale in line with the research conducted by Nicholls (2017; 2019). Students are also validating the utility of visualisation as a more explicit and effective that a textual description (Forte, 1993; Stone and Molyneauz, 1994:15)

"Hi everyone! I've seen something about Building 5 and i liked it very much! First of all I found it very interesting and also i wanted to share with you some information about this trajanic-early Hadrianic structure that is near to the southeast of the Palazzo Imperiale.I was surprised that we still don't know its original function but as this document says, maybe it was used to contain various ships.

Infact we can see that clearly in the image of '3D reconstruction of bulding 5', it is really well made and i'm very shocked when i see, in general, this pictures because they appear absolutely realistic and i think also it's not easy to do something like that but the result is fantastic and it creates more impact than a description. Finally there are also other images and all of you can watch them here: http://www.portusproject.org/fieldwork/buildings/building5/

They allow you to understand how big can be this structure. I've also read others links about these reconstructions and they are great but i prefered to take this one.Good evening " Student 7

In addition, students have also commented to have learned new information not available to them otherwise. The conversations students have shared on Facebook have, to some extent, replicated the comments function on the FutureLearn platform.

"Hello everyone!This experience is going to finish in very little time so I can say it was actually great and really interesting.I've discovered a wide world with a lot of new information and it was amazing to do it all in English.

In fact, this project was very useful because we have learnt a lot about the archaeological site and we have had the possibility to practice our use of English.It was also a remarkable dive in the past, in the ancient history of our land, in particular Rome.

I have really appreciated what was about trade and globalization, because I think this is also a current topic and it's important to know how everything started. It's amazing if

you think that in that period the Roman culture could overcome very long distances without any technological mean of communication.

What surprised me most was the discovery of that stone head underground, because I think an experience like that must give you very special feelings.I'd really like to visit Portus and Rome some day with my classmates, so I hope to have this opportunity soon. Thank you!" Student 8

The third research question (*How can heritage MOOCs create educational links between higher education and schools, to promote cultural heritage literacy in geographically dispersed communities?*) has been addressed with the development of the portal to access all material concerning Portus produced by the University of Southampton and all other stakeholders involved. Despite the encouraging data, students have expressed emerging difficulties during their engagement with the platform. From the interaction with the online material, it emerged that Synote was not suitable at this stage, and a different platform should be used. Students complained about problems logging into the system:

"*Some of us have a problem with Synote, because we can't open the site and it's impossible to see the videos! Can you help us?*" Student 9

"*I've got some problems with the link when I try to open it to see the videos it says that is impossible to open. I did the registration using the LIM in class but when I tried to open it at home, using the computer and also the mobile phone, it didn't work How can I do?*" Student 10

and while videos were watched on the platform, none of the students used any of the other functionalities with the exception of subtitles:

"*They are very interesting and easy to understand using english subtitles! The web site charges the videos slowly, but you can see them, anyway.*" Student 4

"*I use english subtitles too, and I find they are very stimulating and interesting!*" Student 1

Given the recent research published by Galindo-Domínguez (2021) presenting a correlation between the availability of digital resources and the positive implementation of a flipped classroom pedagogy in schools, the development of a portal is crucial to solve the issue students have experienced with Synote. The portal has been developed in conjunction with the Italian schools to ensure it will function as a sustainable multi-language platform and address students and teachers' needs.

At a request, a Portus Portal[139] (cloudtour.tv/portus) on a CloudTour platform would assist the next data collection. The technology developed aims to act as a portal to access all material produced concerning Portus by the University of Southampton and all other stakeholders involved. Students will then access the information online and will upload and link any new material produced during the data collection.

Overall, students are positively surprised by the success of the project given the uncommon remote structure and support part of this pilot:

"Hello everybody, First of all I want to say that this experience enriched my knowledge of Roman history and archeology. Thanks to the videos, the information that Eleonora Gandolfi keeps giving us and the reconstructions made by some of classmates, I learnt so many things. We also could follow some important updates, such as the opening of Portus, which will be this summer, and the Portus virtual tour, which I regard very useful for people like us that haven't yet visited the site. I didn't expect that a long-distance project would have had a so great outcome!

Another relevant point for me was that I've lived this project as a way to get close to the ancient Roman culture and it gave me a so concrete idea of how amazing job Romans did. Besides I could realized how worthy of consideration is the work of the members of the Portus Project, making reliving historical remains.To conclude I want to tell you how glad I am to have participated to this amazing experience." Student 11

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[139] https://www.cloudtour.tv/portus

Chapter 6   Case Study 2: A Work Experience Approach

6.1 Case Study Background

In 2016, the European Unit and the Organisation for Economic Co-operation and Development (OCSE, 2016) defined competences as something that everyone needs for personal development, active citizenship, social inclusion and employment. These soft skills are identified as a combination of expertise, knowledge, and attitudes appropriate to a given context, and represent the "new basic alphabet" employers are looking for (Vannini, 2009: 96). The onus is therefore on schools to ensure that students have the appropriate skills to interact successfully at a global level. At the same time, teachers are consequently responsible for designing and managing learning processes that continually feed a multidimensional formation of the pupils' knowledge (MIUR, 2017). Moreover, recent research have explored the effectiveness of MOOCs as platform to develop skills such as social and learning skills (Littlejohn et al., 2016; Gonzales et al, 2018); ability to work in a team, problem solving and presentation skills (Verstegen et al., 2018; Yasar, 2020). Despite criticism from some authors (Bartolomé, 2013; Vázquez Cano et al., 2013; Berrocoso, 2014) that are believing individual student needs are met, it has been argued how digital learning provide a more flexible and collaborative platform to develop skills to support digital transformation of organisations with a positive impact on the wider job market (Sousa and Rocha, 2018). The creation of a series of open educational resources specifically created to promote health literacy (Perestelo-Perez et al., 2020) and foster digital citizenship on a local governmental level has been already explored and influenced in countries like the United States (Panke et al. 2019), Dubai (Moonesar et al., 2019), France and Germany (Inamorato do Santos et al. 2017). Similarly, in England the impact of governmental requirements on school curriculums is also visible on teacher training, where a MOOC created as part of a Erasmus funded project supports teachers in the design, evaluation and sharing of innovative mobile pedagogies (Cook et al., 2020). Differently from others European countries, Italy does now have an institutional or national Open Education Resources (OER) policy leaving this fundamental piece of innovation into the hands of proactive higher education or schools the development of small scale projects. As noted by Nascimbeni (2020), this is main weakness of the Italian system where universities, schools and teachers have some OER direction as part of the most recent reforms, but initiatives are fragmented

across the different level of national and regional scale and are not linked in a system view or connected to the labour market. Despite this, the Italian National Guidelines for the curriculum (MIUR, 2012: 5), emphasises education must be oriented to make each student acquire their own cognitive autonomy and flexibility in their subject, and to allow students to use the skills developed in everyday life and in the workplace. With this in mind, work experience carried out during the studies or as a post-diploma activity have had a positive impact on developing such skills and on employability. This this in mind, I do recognise the ways in which the material is repurposed at the schools level to develop skills is influenced by government's skills agenda and regulations.

This chapter will look at how the same resources used in Chapter 5 for CLIL activities can effectively be used within a work experience environment enhanced by service-learning methodology. I will explore how this case study can address the research questions 2, 3 and 4 and how outcomes from the previous section have informed the changes implemented in the case study presented here (Figure 73).
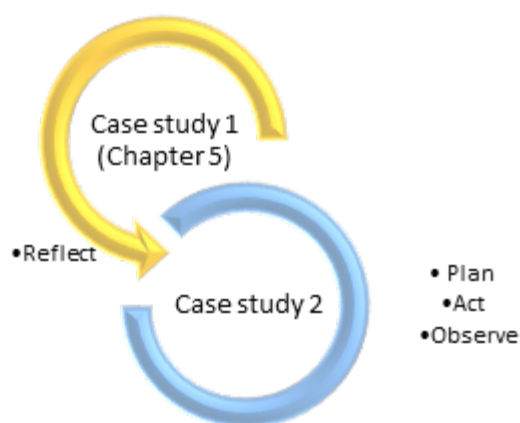
Figure 73 An image representing the action-reflection cycle.

6.1.1   Alternanza Scuola-Lavoro (ASL), or work experience learning theory

The *Alternanza Scuola-Lavoro* (ASL), which translates to "work experience", was introduced in Italy by the *Buona Scuola* reform in 2014, as referenced in Chapter 1. Before the introduction of Law 107/15, work experience was formally available only to students of technical and vocational institutions, even if the option was also informally open to students from liceii. The newly introduced regulation was embedded as a compulsory experience in all curriculum in the form of 400 hours for students based in technical or vocational schools and 200 hours for everyone else. This difference in duration reflected the fact that the first type of school should prepare pupils to enter the job market. Furthermore, the legislation included museums, public or private

institutions working in cultural (heritage, music and arts), environmental and sports societies as a partner to provide opportunities to students.

These reforms/laws represented a crucial innovation in the Italian educational context as it allowed the combination of theoretical knowledge acquired in the classroom with the skills developed within a practical experience (know-how). In 2018, the Italian Government established a National Observatory[140] (D.M. 50/2018) to ensure that developmental pathways are meaningful to students and meet the qualitative objectives predetermined. These changes shifted the focus from theoretical knowledge to the actions that students can carry out with autonomy, responsibility and flexible thinking. Educational and training institutions were invited to revisit their teaching practices to connect theory to practice and students to the real society and to acknowledge the change in skills required by employers. Such a change opened the opportunity to develop a more profound university-secondary school partnership where we could test the research questions presented in this research while supporting teachers and students.

More recently, the 2019 Budget and Finance Bill (Legge di Bilancio, 2019) confirmed a decrease in hours previously allocated to placements from 200 to 80 hours for liceii and from 400 to respectively 150 and 180 hours in technical and vocational schools. Minister Marco Bussetti[141] justified the 60% cut with the need to make savings to fund other measures in support of disadvantaged communities. Toccafondi[142] (2018) and Confindustria[143] (2019) expressed their dissent, stating that students would lose the opportunity to learn and develop the additional skills required by the job market. The benefit of work placements has been discussed widely and recognised as the development of future generations in response to the job market changes and as necessary to create a fluid link between formal and informal knowledge (Fabbri et al., 2015; Iannis and Durighello, 2016; Tino and Grion, 2018; Tino and Grion, 2019). Moreover, data provided by Almadiploma[144] and Almalurea[145] to Ansa (2019), the

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[140] The *Osservatorio Nazionale sull'Alternanza Scuola Lavoro* was created by Valeria Fedeli, Minister of Education, University and Research between 12th December 2016 – 1st June 2018 (https://www.miur.gov.it/web/guest/-/alternanza-scuola-lavoro-insediato-l-osservatorio)

[141] Marco Bussetti served the government of Italy as Minister of Education, University and Research between 1 June 2018 and 5 September 2019

[142] Former Parliamentary Secretary for Education https://www.orizzontescuola.it/reddito-di-cittadinanza-toccafondi-con-i-soldi-dellalternanza-scuola-lavoro/

[143] General Confederation of Italian Industries. https://www.ilsole24ore.com/art/alternanza-scuola-lavoro-poche-150-ore-azienda-AB7mMUTB?refresh_ce=1

[144] AlmaDiploma is an association of Italian secondary schools that aims to support students when choosing their university degree or entering the job market.

[145] AlmaLaurea is a Interuniversity Consortium established in 1994 with the purpose of conducting statistical studies relating to the Italian university world.

Italian associated Press National Agency, suggested that those who have carried out a work placement have 40.6% more chance of finding work. This percentage rises to 70.9% if the internship is carried out after obtaining a secondary school diploma.

Similarly, the UK Department of Education has published guidance for programmes for those over the age of 16 (DfE, 2015a), and revised its statutory guidance for schools (DfE, 2015b). According to the latter, schools should develop 'high-quality work experience that properly reflects individuals' studies and strengths, and supports the academic curriculum and engage with the local employer and community to ensure a 'real-world connection'. Almost all school students at Key Stage 4 undertake some form of work experience in Year 10, and schools have integrated shorter work experiences (between 8 to 12 day in years 10-11 and 12-13) or extended work placements (1 month long offered) into the curriculum (NatCen, 2017). Exactly how it happened in Italy before the latest reform, students on academic programmes were less likely to be offered/to undertake a placement than ones in a technical programme. The research conducted in Italian schools could offer the English system insights on the effectiveness of such an offer for the wider student population.

De Pietro (2019) suggested that the effectiveness of ASL can be improved if associated with the Service-Learning methodology. Service-Learning is an educational practice that refers to:

"[...] community service projects or programs (destined to satisfy in a limited and effective way a true need of a territory, working with and not just for the community), with the participation of students', ranging from the initial phase of planning up to the final assessment and intentionally linked with learning content (including content curricula, reflections, skills development for citizenship and work)" (Nieves Tapia, 2006 p.5). Moreover, participation through observation, interpretation, analyses, and comparison of facts and situations to formulate hypotheses of solutions, alone or with other students develop interpersonal and leadership skills (Astin et al., 2000) while stimulating community engagement (Ransom, 2009).

The peculiarity of this approach is to allow students to combine the learning of the curriculum disciplines with real service to the community (Sigmon, 1979), to become a citizen of the world, able to interact with the cultural values of all while putting their skills at the service of collectivity in a continuous improvement circle (Gradini, 2015). Therefore, the students become active citizens, culturally integrated into a society that today is characterised by complexity, richness of cultures, languages, different religions and ethnic groups.

Service-learning is widely known in Latin America, where school activities are significantly focused on the schools' contribution to the local area (Tapia, 2010; Rota, 2012), and in the United States, where it expresses an American vision in which the community and the individual's contribution are interdependent and closely related (Vigilante, 2014: 159). Among European countries, Service Learning is applied extensively in Germany (Zentener, 2011), in Spain (Opazo Carvajal et al., 2016; Macias Gómez-Estern, 2014), the Netherlands (Bekkers, 2009) and in the UK, where it is known as civic engagement education. Jerome (2012) suggested the change in terminology is linked to the fact the word "service" invokes a feeling of "being at the service of", or the military environment, and would not be appropriate within an educational discourse. In 1998, the first report created by the Advisory Group on Citizenship (Advisory Group on Education for Citizenship and the Teaching of Democracy in Schools, 1998), also known as the Crick report, recommended the introduction of citizen education in schools underling the importance of experiential learning (Crick, 2000). As a result, many schools have started programmes defined as "active learning in the community" or "community-based learning for active citizenship" that enhances British experiential learning while aligning to the Service Learning model (Annette, 2006).

In Italy, schools are only just beginning to include Service Learning in their curriculum after having been oriented towards pedagogical activism thanks to the attention that the MIUR (2018) has placed towards this methodological approach promoting the "Olympics of the Service Learning". However, this does not exclude the existence of long-term projects with learning and community aspects (Vigilante, 2014). An example is represented by the "*Adotta un monumento*" (Schools Adopt a Monument) project promoted by Naples in 1993. It was a lifelong learning project directed at young people to encourage a better knowledge and appreciation of their cultural heritage. This successful project created an entirely new approach to the preservation and promotion of Naples' cultural assets. Students were invited to adopt a monument in their city or in the proximity of their school. In order to protect the structure, pupils had to engage with it and study it. Only in this way can cultural assets take on their social role; it thus becomes an instrument of growth for the whole community and is recognised as a historic focal point around which the community establishes its identity. The project proved that the reacquisition of the cultural value of the historical and artistic heritage is not enough on its own; it must always be accompanied by moves to encourage a greater awareness of its importance and the need to preserve it on the part of the whole community.

As Fabbri argues (2007), service and learning must be considered as a balanced relationship combining community service with curriculum goals, stimulating the development of citizen's responsibility towards their own community in every student.

Participating in the study, presented in the following paragraphs, the school consolidated the transition from a didactics of knowledge to the teaching of skills (Trinchero, 2016) where the pupils undertake authentic tasks (knowing how to do, knowing how to be) to be able to address everyday life problems and, above all, active citizenship in a dynamic and flexible way (Lave, 1988). As indicated previously, Service Learning is a methodology that allows students to carry out experience-based learning on the learning by doing and situated learning approach (Lave, and Wenger, 1991; Brown et al., 1989; Rivoltella, 2016; Rossi 2012; De Pietro, 2013) oriented to the development of transversal skills[146].

The Italian and English systems are similar in the way work placements are integrated in the curriculum, even if students have more hours allocated to this activity in Italy. Moreover, both countries recognise the importance of Service Learning/civic engagement and that it can help students to observe and develop Soft Skills. Both systems are well aligned, allowing me to assume results from the Italian case study could be easily applied to the English context.

In 2018, King's College London has published a *Service Strategy* - as part of the *King's Strategic Vision 2029* – where Service Learning is used to create a platform for staff, students and alumni to lead, participate or deliver different sustainable service activities. The aim is not only to generate, test and deliver new and innovative contribution to the society but also to develop individuals participating personally and intellectually while contributing to the local (London) and global community.

The Portus project extensive engagement with students on the site, Italian local authorities and community has created a series of activities and tools that have been reused locally and could also contribute to the King's Service Strategy. For example, the Portus tour with geolocation has been widely used by the local community as tool to explore the site in absence of organised tours. Results from these pilots (e.g. translation of resources from English to Italian) can be used by the local community to

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[146] As defined by the EU funded project VISKA (2017), transversal skills are commonly understood as: teamwork, effective communication, foreign language proficiency, entrepreneurship, creative thinking and problem solving. Transversal Skills are also referred to as generic skills that include soft skills (such as communication, problem solving abilities, teamwork and motivation), but also encompass ICT, language and cognitive skills (such as collaboration, negotiating and information-sharing).

attract and engage potential tourists. In this way the students are linking their compulsory educational experience while producing resources for the local community.

6.2 Creation of an Educational Portal

The issues outlined at the end of Chapter 5 related to student interaction with resources within Synote, in particular, access to videos required changes to the way they were made accessible.

Although FutureLearn allows individual pages to be "open"[147] and permanently accessible to external audiences when a MOOC ends, to access this information, users are required to know the specific web address. Furthermore, any navigation that was available during the course is also disabled upon its closure. During the lifetime of this research, FutureLearn platform has gradually changed in response to the wider educational context. Courses can now be "retired" by institutions making the learner aware the content of the open step is not maintained or updated (Figure 74).

> i PLEASE NOTE: This course was retired on 29 Jun 2020. This means it is no longer being updated or maintained, so information within the course may no longer be accurate. FutureLearn accepts no liability for any loss or damage arising as a result of use or reliance on this information.
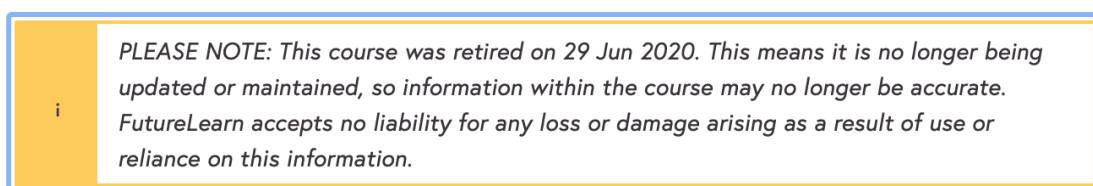
Figure 74 Example of disclaimer now visible on the Archaeology of Portus MOOC open steps (https://www.futurelearn.com/courses/portus/0/steps/10937) as a result of the retirement of the MOOC.

In addition, the platform did not provide subtitles in multiple languages at the time of the research, as this functionality has only been enabled since the data collection was completed. To mitigate the two issues just described, the videos selected for this study were uploaded on Vimeo. The rationale behind this decision was connected to the fact that Vimeo has a user-friendly interface, allows videos to be changed without removing analytics and comments — unlike YouTube — and provides subtitles in multiple languages.

The next step was to explore a user-friendly way to display and link content without requiring a login, or any personal information.

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[147] FutureLearn introduced the opportunity to make individual steps open, so that it is not required to sign in to see or share them. (Chastney, 2015)

With these requirements in mind, I worked with the CloudTour developers to test their platform as part of this research. CloudTour is a web-based platform that was initially developed in 2016 to provide educational virtual tours of underwater heritage sites. The platform features a suite of interactive tools including audio, video, web RTI, high-resolution viewers, scrollable CGI sequences, and offers support for the embedding of any externally hosted content, such as SketchFab. Channels and collections from sites like Vimeo and Flickr can also be dynamically hosted through the platform and will automatically update when changes are made, or content is added.

Consequently, it provided an easy and straightforward way to combine all the platforms adopted by the Portus project, as described in Chapter 4. Furthermore, sustainability is taken seriously by CloudTour and as code across the platform is refined for newer tours, these changes are also retroactively applied to any previous projects.

With an aim to reach as many users as possible, CloudTour is optimised to work with all devices and connections. To do this, it adjusts streaming speed and visual quality to optimise the best possible configuration for the user. An example of this can be seen when a computer might not have enough hard drive space, as CloudTour will recognise the issue, alert the user and then change to the mobile version instead. The platform can also work out the average download speed of the connected user and change between full high definition, half and standard definition content.

In line with the research aims presented in previous chapters, the Portus Portal (https://www.cloudtour.tv/portus) organised existing online content into a visually led resource that was easier for the user to navigate. Unlike the MOOC that structured information in a linear fashion, the web tour provides flexibility to explore and interact with content at the users' discretion. The opportunity to follow a more structured and chronological way to access the resources was maintained by the link on the home page to the Portus Tour created by Peter Wheeler and presented in Chapter 4.

The landing page (Figure 75) uses top view renders of each period previously created for the Portus project overlaid with maps referencing individual buildings and areas of the landscape (Figure 76). This overlay functionality allows the students to visually explore the development of the site through its periods using the top menu or the option at the bottom of the screen.

The right-hand side menu allows users to choose the preferred language, image resolution and to export images from the tour to be re-used.

Figure 75 An image of the Portus Tour landing page.
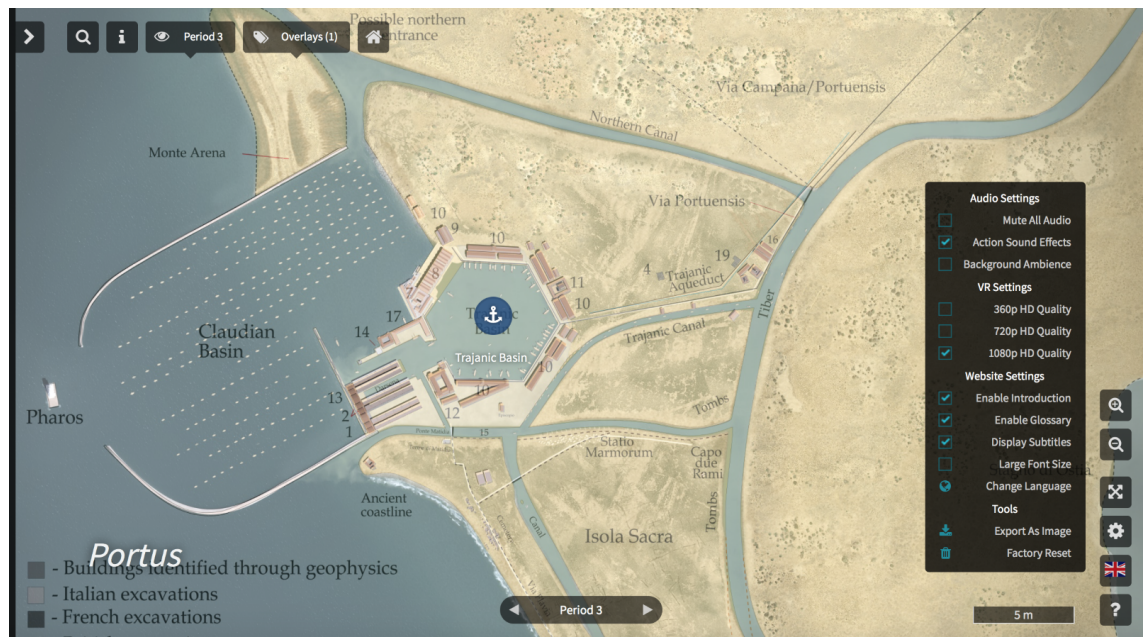
Figure 76 An image of the Portus Tour overlays.

The menu provides access to the content based on the pre-defined categories developed as part of the first case study (Figure 77).
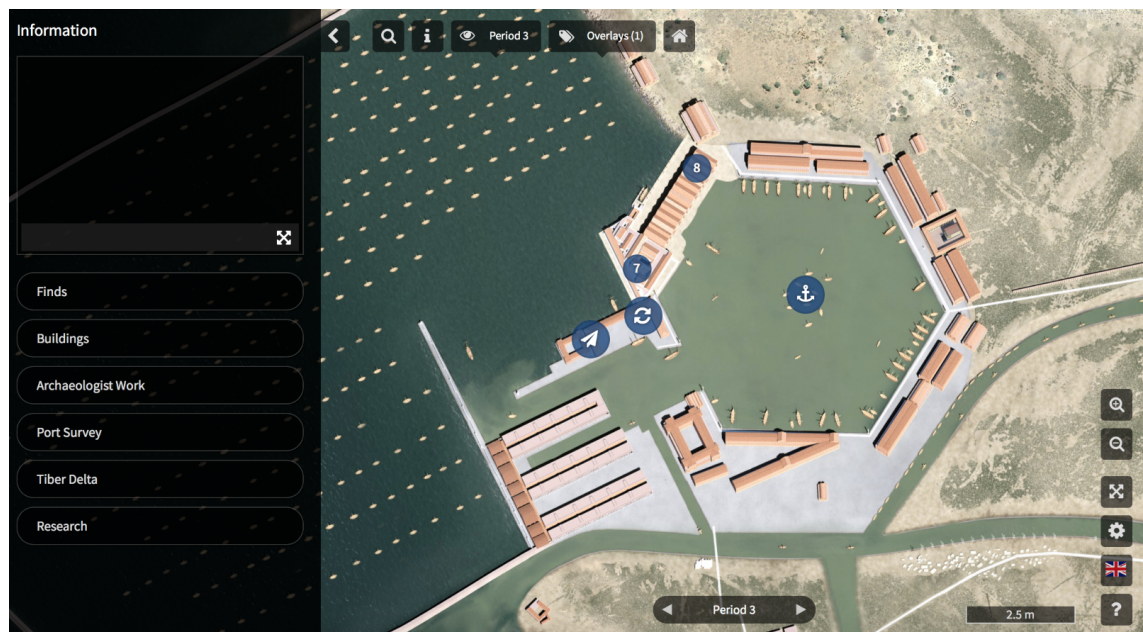
Figure 77 This image shows how to access the categories.

Whilst individual buildings are marked on the map as a "station", after selecting, the left-hand menu provides access to all the resources, grouped by type (videos, photos, articles, panoramas, 3D models), that mention that particular building (Figure 78).

Figure 78 This image shows how the content is displayed on each station.

Resources have been linked dynamically to the tour using existing metadata from Flickr, Vimeo and other platforms and displayed as a collection in the centre of the screen.

The Portus educational tools also allowed us to embed a panorama directly into the system as demonstrated in Figure 79.
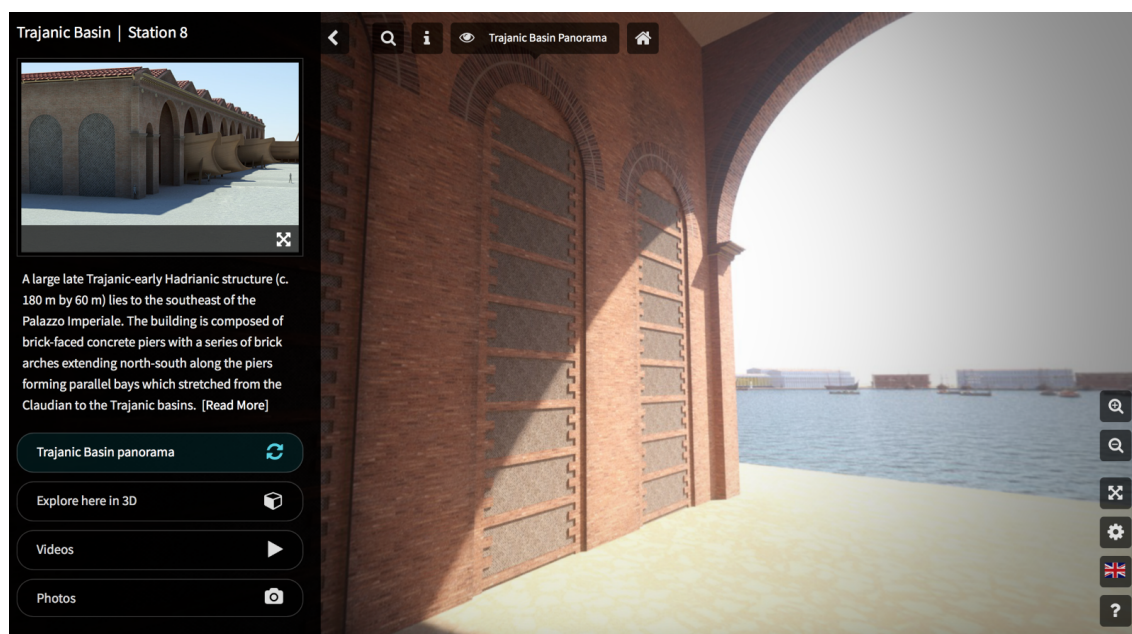
Figure 79 A screenshot of the panorama as shown on the CloudTour platform.

6.3 Collaborating with the School in Practice

The second case presented in this chapter involved 17 students from the IV Liceo of the applied sciences at the Istituto Comprensivo Galvani in Milan. In contrast to the school that participated in the first case study (see Chapter 5), this study pathway aimed to harmonise scientific culture and humanistic tradition, enhancing a scientific and epistemological approach to world problems, including influences from the artistic field.

The course guides the student to deepen and develop their knowledge and skills necessary to follow the development of scientific and technological research. It also supports students to explore the interactions between the different forms of knowledge, languages, research techniques and related methodologies, through laboratory practice, direct experience and alternating school-work paths.

Specific development activities offered by this school include educational experience in the physics and chemistry laboratories of Bicocca University, participation in

conferences and debates at the University Statale, and participation in a project that prepares students for how to approach the admissions test and transition to an engineering degree at the Polytechnic.

As extensively covered in the section related to the Italian education system (see Chapter 3, section 2), foreign language proficiency is still a central aspect common to all education pathways. To meet this requirement, the school employs a native English teacher to support CLIL activities with the subject lead, and has offered the possibility to participate in language courses abroad lasting one week in the second classes, and entered into partnerships focused on practical experiences requiring the use of English.

The initial engagement with the lead teacher, Professor Fugaro, was facilitated by the local Ministry of Education's office that circulated a call for interest to all schools in the Lombardy region. This region was targeted as the British Council has stronger links with local institutions and has an office in Milan. Professor Fugaro contacted me directly expressing an interest in involvement in the research and in using the material as part of the compulsory placement (Alternanza Scuola-Lavoro) included in the curriculum:

"Ci piacerebbe aderire al progetto futurelearn per la prossima annualità con due classi quarte del Liceo . Si tratta di studenti con livello di inglese b1/b2 in alcuni casi anche c1. Sarebbe possibile rimodulare il progetto come alternanza scuola lavoro trattandosi di un project work con tutor a distanza ? Per noi costituirebbe una semplificazione considerando tempi e risorse da impiegare ed ottenere un attestato di competenze sarebbe un incentivo per gli studenti. Sono referente alternanza scuola lavoro quindi disponibile a qualsiasi chiarimento.

Pensavamo inoltre alla possibilità di visitare a fine corso i luoghi oggetto di ricerca con gli studenti coinvolti . Sarebbe possibile?"

"I would like to join the FutureLearn project next academic year with two classes from IV Liceo. Students a level of English equal at b1/b2 and in some cases c1.

Could we apply the project as alternanza scuola lavoro as this is a work project with a remote tutor? It would represent a simplification of time and resources we have to put in providing placements, and a final certificate will constitute an incentive to students. I am in charge of the alternanza scuola lavoro, and I am available for any clarification.

We were also exploring the opportunity to visit the site with the students at the end of the project. Would this be possible?"

After a series of virtual calls where Professor Fugaro underlined the pedagogical requirements that the work placement had to meet, I offered advice on how the material could be used and which activities could be created to link the content. Moreover, we designed a series of activities to take place, aiming to give each student a training experience aimed at the acquisition of the following learning objectives:

1. An increase in problem-solving skills
2. The use and development of soft and communication skills
3. Enhancement of time management and organisational skills
4. The progression of teamwork skills and the ability to see the bigger picture
5. The awareness that skills and passions can be transferred to the job market

A new activity programme was proposed to engage the students who would be supported during their time in the classroom by professionals (e.g. English teachers, architects and myself) to improve their knowledge of the English language, 3D modelling and archaeology. The use of 3D modelling with the support of an architect represented a perfect opportunity to explore how technology can be integrated into the classroom as a tool to develop critical thinking while developing digital skills, similarly to the projects developed by Nicholls (2016: 2017; 2019) and Dell'Unto (2019). All new skills acquired would then be used to produce tangible outcomes and be included in the final group co-creation of new content where the archaeological notions learnt were applied to a local context (Appendix E).

6.4 Methodology

The collaboration lent to select a series of curricular and extracurricular activities aimed to meet the learning objectives described in the previous paragraph. In line with the government requirements presented in Chapter 3 and at the beginning of this section, agreed outcomes included the enhancement of the English language and other skills (such as multimedia, modelling, photographic) using heritage content; increased knowledge of the British higher education system and job market opportunities, and the application of multidisciplinary approaches to problem-solving.

The activities I have developed and that have been approved by Professor Fugaro were divided as follows:

1. <u>Learn heritage information and apply knowledge to the local area -</u> Students were invited to access the multimedia content on the online Portus portal[148] and to use the time in the classroom to discuss individual and group work projects in

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[148] https://www.cloudtour.tv/portus

a flipped-classroom approach (Låg and Grøm, 2019). As the educational pathway of the class involved focused on architectural studies, students were presented with a building/infrastructure centred narrative. Pupils were asked to:

    a. think about if there were similar provisions in Milan. The class also spent an afternoon exploring the centre of Milan with an architect working at the school to identify parallels in buildings.

    b. write up to 200 words in English on how the building in their hometown is similar to the one in the video.

2. <u>Translation of resources from MOOCs</u> - Text from the online course, mainly related to objects, was shared with the students who had to translate it into Italian. Students were then asked to visit a local museum and describe an object from the local collection.

3. <u>Face to face meetings</u> – I have visited the school once and delivered a two hours lecture on practical archaeological skills that can be delivered, career prospects and personal development opportunities via formal and informal activities.

4. <u>3D Reconstructions skills</u> - This activity focused on the creation of a 3D model in SketchUp based on their interpretation of the Magazzini using the help sheet available online. This step was facilitated by the architect in the classroom that supported the students while learning SketchUp. Students were also given the opportunity to reconstruct a different building based on the previously translated text information or to create a model of a building identified in activity 1a.

Following the same methodology developed for Pilot 1 and applied by Nicholls (2019), were introduced to the information about heritage via the videos, the visit before starting to explore the 3D reconstructions. Similarly, the architect attending some of the classes would have then offered the practical support, differently from the first pilot, on how to best use the software.

As in the previous data collection, the students have completed a survey at the beginning and at the end of the project to test their perception of knowledge. Questions were not changed to allow a direct comparison between the two cohorts. However, an additional final survey was introduced to collect students and lead teacher's comments on how each online resource utilised was supporting learning objectives and personal development.

6.5 Survey data collection

At the time of this second pilot, I moved my PhD from the University of Southampton to King's College London. As in the previous research, the questionnaires were reviewed and piloted by the teacher before the start of the data collection using Microsoft Forms, the King's College University survey platform. The survey replicated the one originally approved by the University of Southampton's Ethics Committee (n. 17842) and was reapproved by the Arts and Humanities Research Ethics Panel (LRS-17/18-5211). All research participants gave their consent prior to taking part in the pilot. Students' families were also informed and gave their consent directly to the school.

In compliance with King's College London's policy on data collection and the Data Protection Act (1998), the data collected, and their analyses, are backed up on a password protected offline external hard drive and intended for the purpose of this study only. Students' information has been anonymised and any identifying information obscured during the analysis and writing. The data collected was exported and visualised following the same procedure illustrated in the previous chapter.
The data collected with the online survey helped me to define the student profile.
Like the class in Turin, the majority of the students are from Milan with only a small percentage of students with family from abroad or from a different part of Italy (Figure 80).
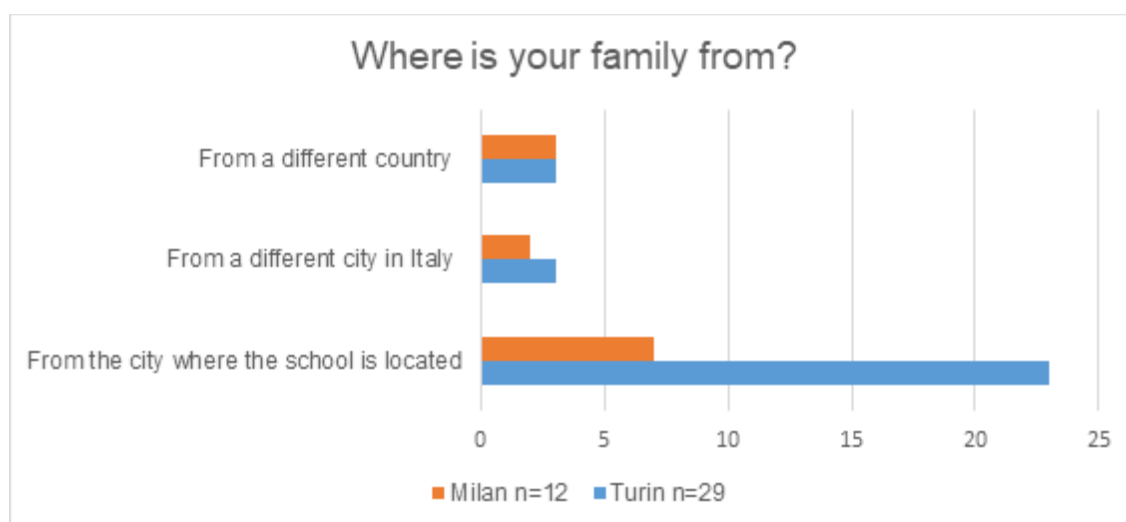

Figure 80 The graph shows the origin of the students' family, including the results from the previous case study to facilitate comparison.

Similarly to the previous case study, students were using social media more than once per day. However, the most used platforms were Instagram and WhatsApp, showing a change in preferences between the two cohorts (Figure 81). The results show how

different the two groups are and how having this information at the beginning of the study informed which decision to take. Given the low usage of Facebook and the support provided within the school, it was decided not to use any social media, and to utilise Dropbox instead as shared working space, as every student already had an account and were familiar with it.
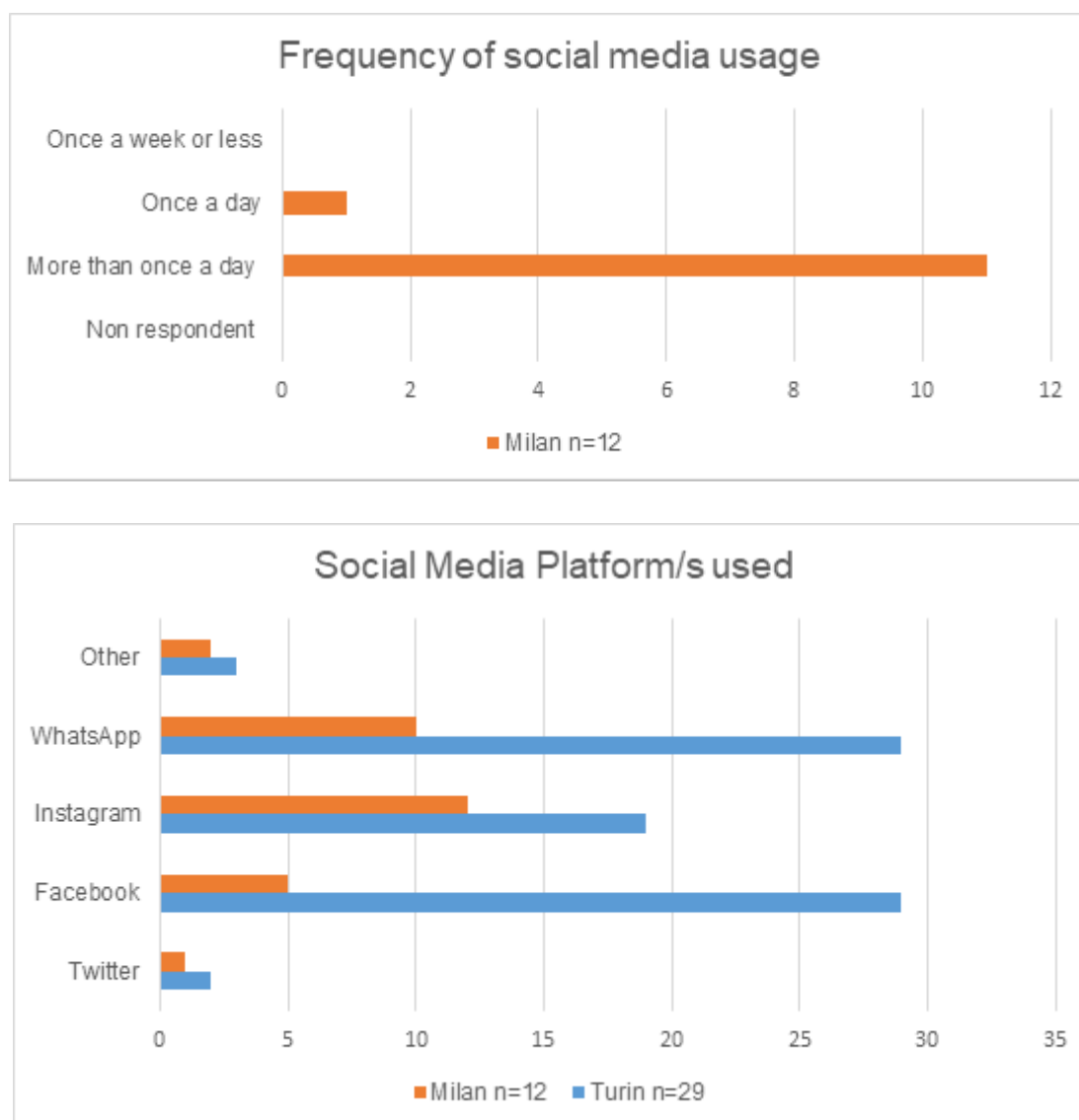
Figure 81 The graph on the top shows the frequency of social media usage amongst the students surveyed. While the one on the bottom shows the preferred social media platforms utilised.

6.5.1 Consumption of heritage

School books remain the main source of knowledge for students in Milan when learning about historical and archaeological information (Figure 82). This makes the impact of content provided by textbooks on knowledge acquisition more evident. Whilst

half of the students completing the survey have visited a museum, only one would use it as a learning activity (Figure 83).
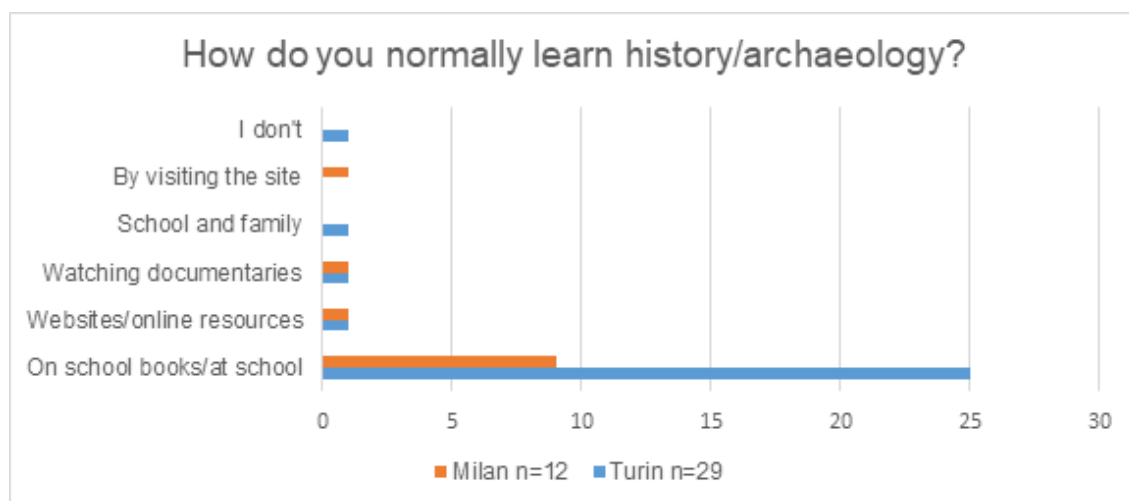
Figure 82 The graph shows how students taking part in the projects usually learn about history and archaeology.
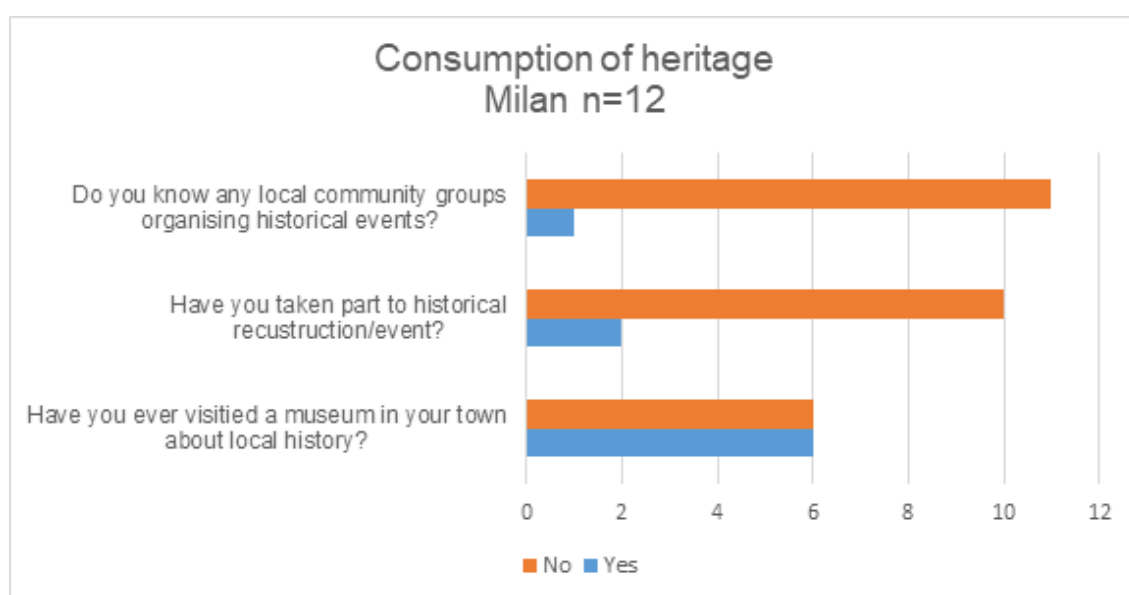
Figure 83 This graph shows how students engage with heritage in their local area.

6.5.2   Outcomes of the study

The class received detailed instructions on where to access information, on the tasks to be completed and where to upload their final work at the beginning of the project from Prof. Fugaro. As part of the first activity, they initially watched the videos and then started to plan which part of Milan to visit. During their tour of the city, supported by an architect working at the school, students decided how to record the areas of interest, taking pictures to be used as a reference on the following activities. All photos were

uploaded to Dropbox without any metadata or naming convention, removing the possibility to quickly and efficiently search the archive. As a successive step, eight different texts in English were created to describe a heritage building in Milan with the exception of one that relates to the population of Milan (see Appendix E).

SMOG analysis of the text (Figure 84) shows that the majority of the text produced is suitable for A-level students as extensively covered in Chapter 2, section 6.
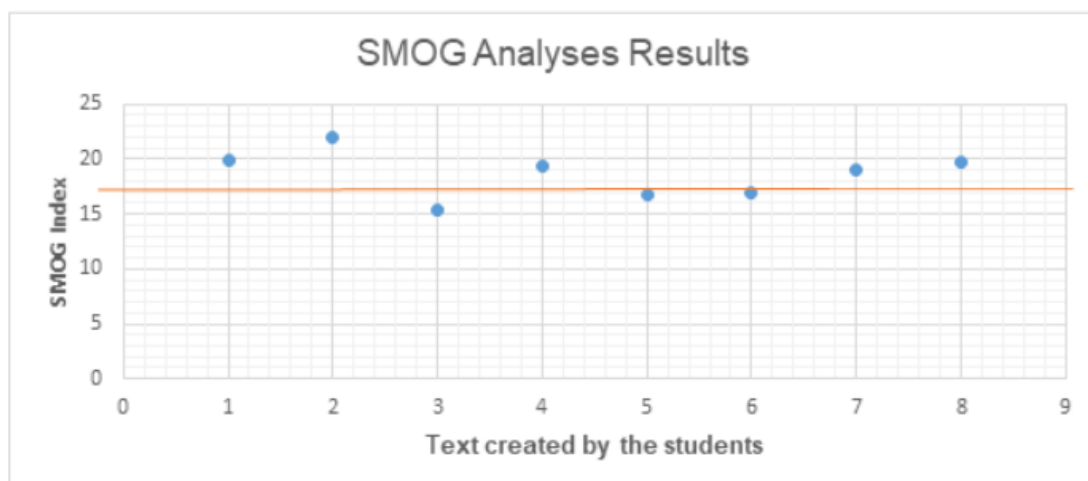
Figure 84 The graph illustrates the SMOG analyses results for the text created by the students. Results above the orange line define text suitable for A-level students, while the one between the lines is understandable by GCSE lowest grades.

Students then focused on the translation of resources from the MOOC. The selected text was mainly referring to architectural features presented in the videos and common finds (e.g. pottery and brick stamps).

The Gulpease Index was applied to the translated text (Figure 85), attesting that the appropriate language level was achieved.
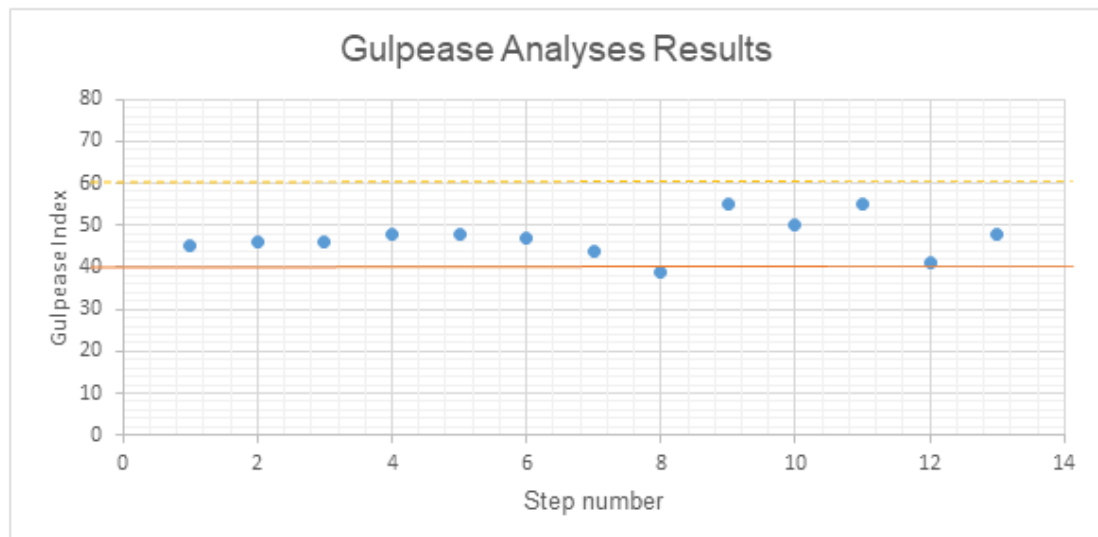
Figure 85 This graph represents the analysis of Italian translations using the Gulpease Index as outlined in Chapter 2. The green and orange lines identify the range of values for text that is easily readable by A-level equivalent students. The dotted yellow line identifies the value text should achieve to be easily accessible by younger students.

In December 2018, I visited the school and delivered a two-hour class for the third activity of the project. During the lecture, delivered as an informal workshop, students were invited to draw parallels between the Roman and modern world. The class discussed topics such as globalisation, trades, arts, and fashion. Archaeological material, including some fragments of pottery, were shown to the class to familiarise them with finds. Students were interested in knowing more about field archaeology and the educational and personal development path to follow to enter the profession. They were also surprised by the opportunities available in archaeology around the application of technologies to the heritage context.

However, only one student completed the last task choose a monument of their own choice instead of using the guideline provided (Figure 86). The student was particularly interested in learning the software and the modelling process independently from the type of the building selected. He researched and used the photographic evidence collected during the visit to reconstruct part of a site in Milan.
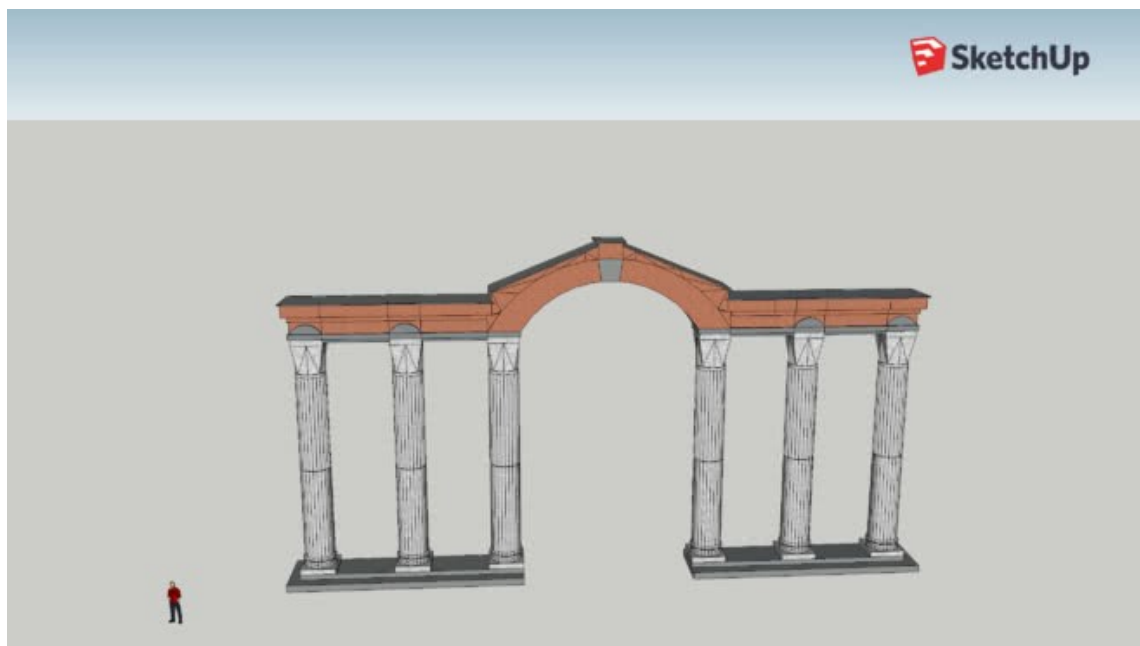
Figure 86 This image represents the 3D image created by the student in SketchUp.

6.5.3   Self-assessment of knowledge and suggestion for improvement

Students were asked to rate their perceived level of knowledge about Rome and the Roman world at the beginning and end of the project. Results (Figure 87) show that at least four students have improved their knowledge through this process. Only three students have specifically mentioned having learned more about Portus and in particular about its archaeology, the Claudian age, and that it was an important site near to Ostia.

In addition, 4 out of 17 students stated to have learned more about the history and archaeology of Milan. Specifically, they learned general information and that the Roman age was interesting. One of them stated that the learning process occurred while researching online several ancient buildings to create a 3D project. Once again, this statement confirmed the effectiveness of the use of 3D interactive models to develop critical thinking and digital skills (Nicholls, 2019, 2016; dell'Unto, 2017; Earl, 2013).

Despite the fact that all students spent a day taking photos of historical monuments in the centre of Milan, only four students indicated they visited a museum or a heritage site as a result of the project, so the first activity was not fully completed. It remains unclear if some have visited a museum and not declared or if they have not been to a museum at all. The lack of engagement with activities could be related to the placement's pedagogical structure or the perception students have of the museum

environment. Visits to museums are traditionally included in the student curriculum as school visits and are not always perceived as an independent activity outside formal education (Giannini, 2019) . In addition, a study conducted Fitzcarraldo (2006) on Italian teenagers has discovered that museums are often associated with negative feelings connected to the perception of a dated and not engaging environment.

It is also interesting to note that this students' disengagement with the museum visit is in contrast with the feedback received from students recognising the positive contribution a site visit would have made to their learning.
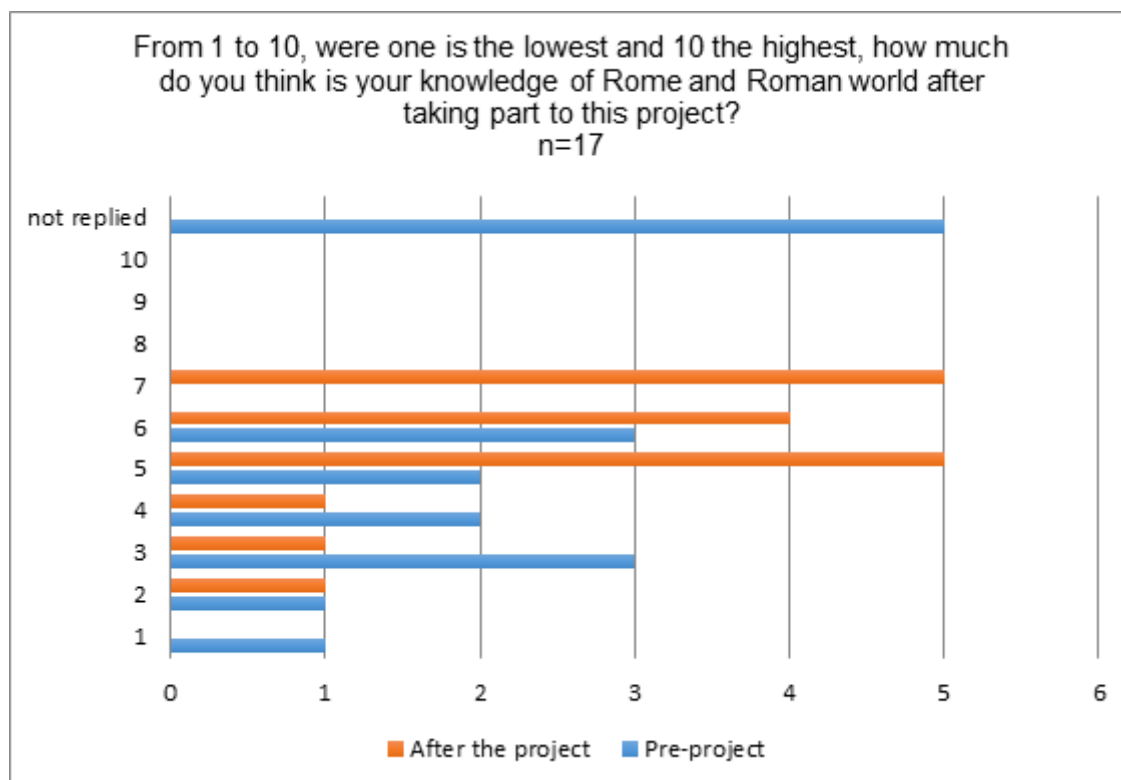
Figure 87 This graph shows data on perceived knowledge about the Roman world by the students in Milan at the beginning of the data collection.

Figure 88 shows that at least 11% of the students felt more confident in using English in the classroom. Unfortunately, due to the low completion rate of the initial survey, this data cannot be more precise. When asked a direct question if they felt more confident, the majority replied that the translation exercise helped them to increase their comfort. Only two said no improvement was noticed and one did not reply.

When asked if they felt a connection with Milan, only two replied negatively, but they did not explain their answer. Four also stated that their connection with their town improved because of participation in this research. The task allowed them to learn more about the history of Milan and its significance during the Roman empire.

235
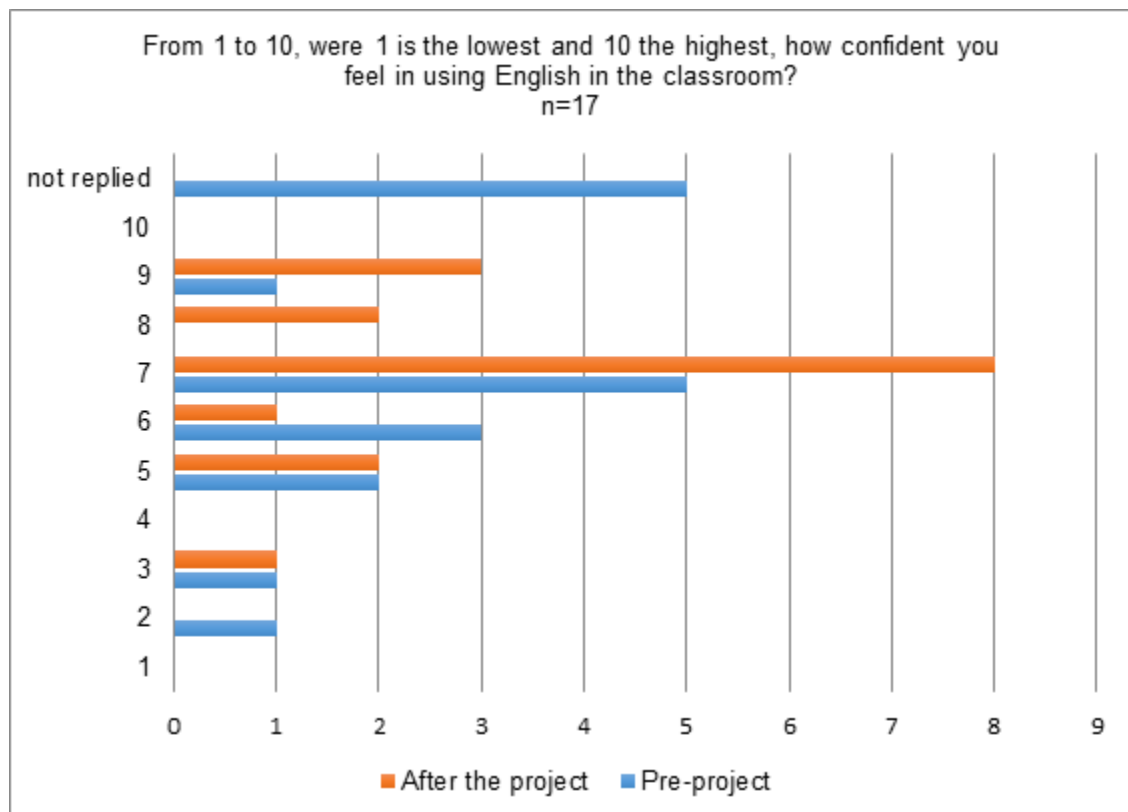
Figure 88 This graph shows data on how confident the students in Milan feel in using English in the classroom.

The effectiveness of the activities is proven by the results illustrated in Figure 89, where students list the skills and concepts they have developed during their work experience. Students learned how to translate texts and improved their level of English. The translation was also defined as the most useful activity followed by the face-to-face meeting (Figure 90). In particular, students found the lecture useful to see the finds, to learn about the job of archaeologists and the methodologies used on the site. However, they all seem to prefer structured activities they are familiar with (e.g. translations) rather than exploring modelling, which could have been outside their interest. It is also important to recognise that during the visit, it was clear students had an interest in exploring new technologies to better understand heritage. Their low engagement with the last phase of the pilot might only be related to the reduction in placement hours.

Figure 89 This graph illustrates which skills and concepts have been learned by students during the project.

Figure 90 The graph above shows which activities students found more useful during the project.

The general feedback was that a visit to the site could have contributed to make the experience more interesting and would have been beneficial. In addition, it was suggested to include specific content on the sewage system and that the opportunity to study Portus more, in general, would have been appreciated. Even if the project has been defined as really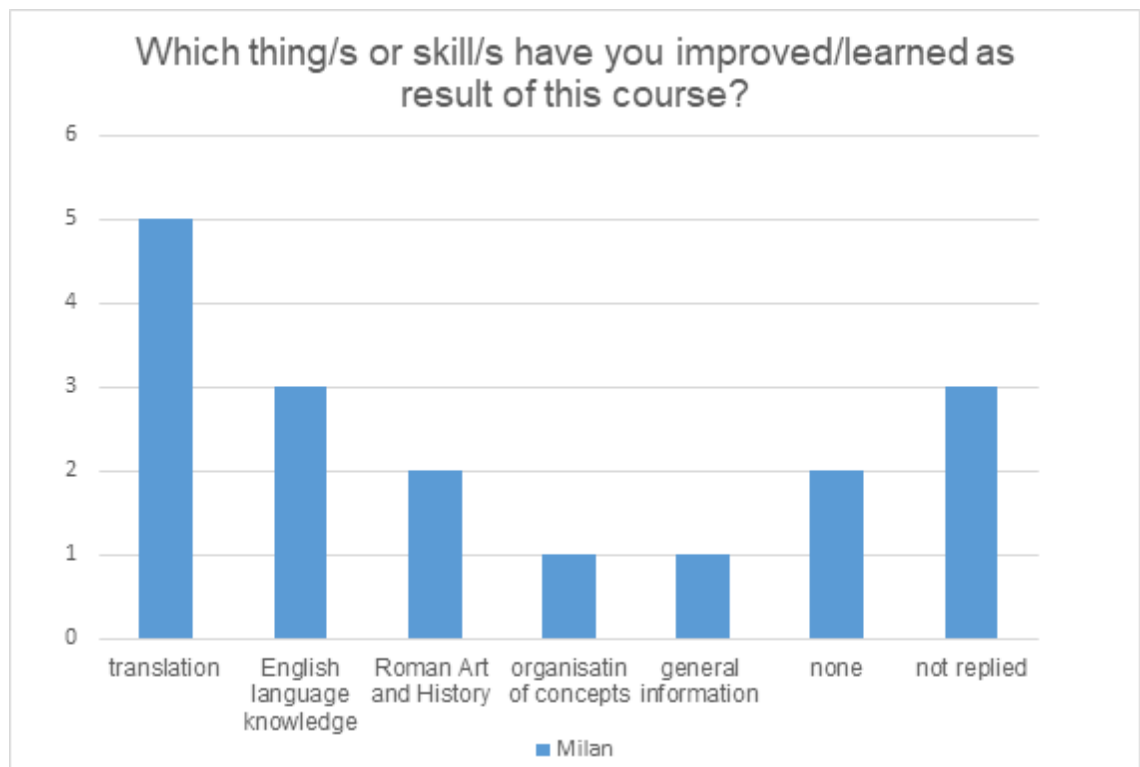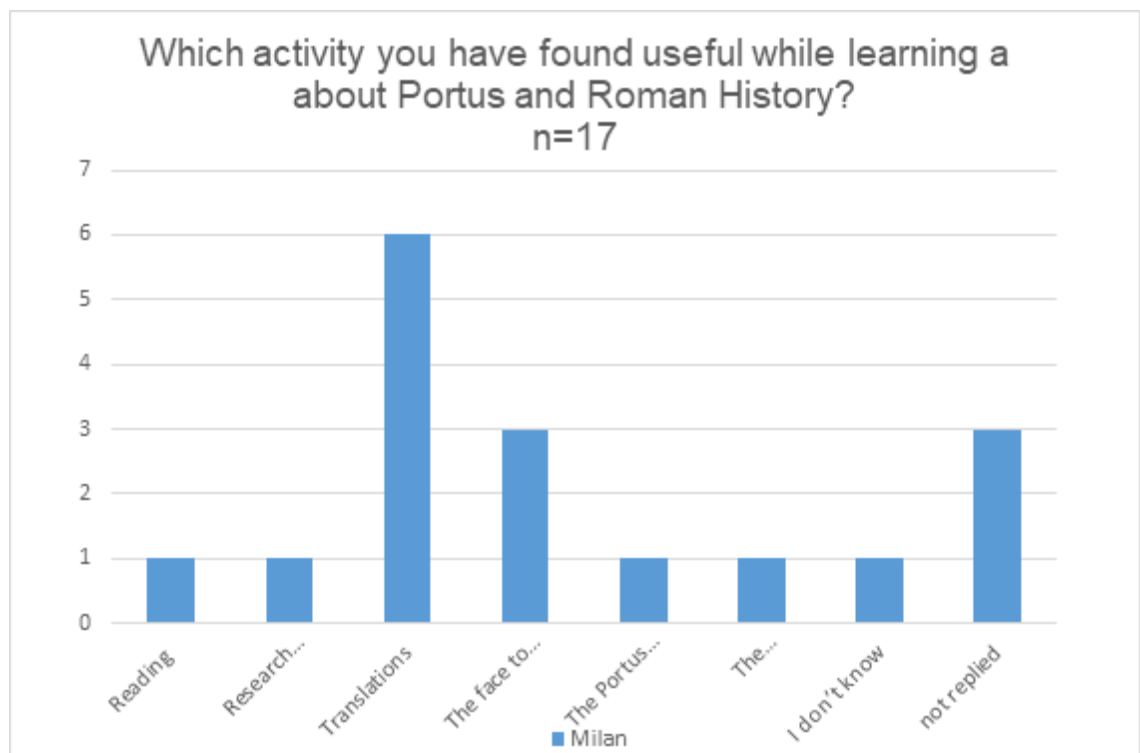 interesting and engaging by the majority, the 3D activity was considered less useful, even if in line with their educational pathway. This might have been related to a lack of clarity on learning outcomes connected to the project.

One of the students shared a less positive feedback:

"I think that the project it was badly managed, because i didn't know what to do exactly. But I did the translations nicely"

When critically reflecting on this comment, it seems clear that there might have been a correlation between the student engagement in the project and the clarity of the learning objectives. While the work placements objectives were planned and discussed with the teacher, it might not have been clearly communicated to the other tutors and to the students. Differently from the first pilot, I had no direct contact with the students until the visit minimising the opportunity to support and further clarify expectations.

Clauder and Adefila (2014) explored how the engagement and enthusiasm of the educators can positively contribute to increase student engagement during a work placement. It is possible that not all educators were engaged with the project as much as Prof. Fugaro, conditioning some of the low engagement with some activites from the student.

6.6 Resources analyses

At the end of the project, both the students and the teachers were asked to comment on how each resource included in the tour could have helped them to meet their learning objectives.

The table (Table 18) below allows a direct comparison between students' and teachers' feedback about the major digital resources available online.

RESOURCE	STUDENTS' VIEW	TEACHERS'S VIEW
THE PORTUS TOUR WITH GEOLOCATION	Students liked how the site was organised and recognised the content could be used to learn about the site. A student commented about the complexity of the text included, while another commented about some technical problem with the map layout that made the experience less engaging.	Clear, comprehensive, profe… more engaging and interacti…
THE PORTUS PROJECT FLICKR ACCOUNT	The students commented positively on this resource, defining it as really engaging. The photos, defined as unusual and clearly taken by archaeologists, provided a visual element that was needed to appreciate the scale and archaeological features of the site. Students connected this resource to the creation of 3D models, as the pictures clearly show the site, and give an insight into the profession. Students commented on how the photos are used as a reference to some new English terms, even if they were not supporting an in-depth improvement of language skills.	Prof. Fugaro described the p… curiosity and stimulate indep…
THE PORTUS PROJECT WEBSITE	Pupils recognised the site contained extensive information that could be fully complemented by the Portus project Flickr account. The presence of many links allowed them to explore the topics at different levels, and *"it's easy for people to understand the site of Portus"*. The content provided helps to improve language skills and to know more about Portus, but not to learn how to create a 3D Model. Some did not like the layout, the navigation and the inconsistency of pictures' location within the posts.	Professor Fugaro positively… consistent with the average… sectorial lexicon increases … the historical-social area.
THE ARCHAEOLOGY OF PORTUS MOOC BLOG	Similarly to the Portus project website, the blog offered the information necessary to understand the site while the images illustrate archaeologists work on the site. It helped to learn more about the site, Roman history and improved language skills. However, it did not offer the opportunity to practice their English directly or to learn how to make a 3D model.	The teacher felt this resour… modelling section. The stude… necessary to engage with th…
THE PORTUS PORTAL	The Portal is one of the favourite platforms to learn more about the structure of the port and to support 3D modelling skills development. The visually centred approach facilitated students when learning specific terminology applied to the historical context. Students suggested the resources could be improved by providing more clickable hotspots and translations in other languages.	The teacher believed the pla… research and the constructio…

Table 18 Students' and teachers' feedback about the major digital resources available online included in the Portus Portal

6.7 Problems encountered and reflections

The second case study presented different difficulties that are likely connected to communications between the parties. During the course of the project, I maintained a direct line with Professor Fugaro, however, I have not communicated with the other tutors involved. A more structured communication with the other tutors would have ensured a more cohesive pedagogical approach. However, the initial purpose of this project was to assess how the content could be independently and flexibly repurposed by schools. Students have not had any direct contact with me until my visit on-site and would have benefitted by more direct communication earlier on.

The project was planned as a 400-hour placement spread across the academic year. The rationale was to create a flexible opportunity that would have given the opportunity for students to develop their skills fully. However, in December, the government decreased the hours required to complete the placement, and the school decided to interrupt the placement earlier. In that moment, students had already reached the hours required for the placement with the preliminary work on the translations, the local site visits, and the introduction to 3D modelling made by the architect. For this reason, only one committed student completed the 3D model, in his own time and with minimal support, while the others decided not to progress the other activities any further.

In addition, some of the students did not complete the final questionnaire appropriately or failed to complete the initial one. Moreover, it appeared that the students filled the survey superficially and made the information potentially unreliable. This was in contrast with the cohort on the first project, who seemed to have taken their participation to the project more seriously.

6.8 Concluding thoughts

This second research study has contributed to understanding how the material could be reused by school teachers to create alternative work placements using the service-learning methodology. The unplanned reduction in the hours available during the placement has definitely impacted the engagement during the last activity of the pilot. While recognising this risk was never considered during the planning phase and that a mitigation plan was not created, the number and extent of the activities co-designed with the teacher might have been too optimistic and reliant to the student's proactive interest to learn and develop skills in their own time. Dividing the class into two groups focusing on the translation or modelling, or the

240

development of more individual pathways (Badwn, 2008; Belshaw, 2012) might have been a better approach with a consequent further engagement and development of digital skills.

Results from the online surveys have addressed the first research question (*Can such heritage MOOCs increase access to education content amongst secondary school students?*). At least 23% of the students felt more knowledgeable about Rome and the Roman world. The analyses of the resources have also emphasised which platforms are better suited to engage users and can be used to meet specific learning objectives. The images uploaded in Flickr were taken on site, giving a glimpse of the work of the archaeologist and presenting their point of view. For these reasons, they appear as 'unusual' to the students, attracting their attention, once again proving the power of the images in provoking conversations (Haynes, 2017; Stone and Molyneauz, 1994; Forte, 1993). Differently from the previous pilot, students stated that images have also been used to develop their language skills as a visual reference to subject specific terminology. All the other resources are complementary to each other. Each of them offers a new and different entry point to the extensive digital material created by the Portus project team during over ten years of work. Both students and teacher stated that the Portus portal, with its visual orientated approach, is well placed to provide a flexible and engaging space for students to explore the content independently and develop critical thinking. Similarly to the platform developed by #dariaTeach, the portal was developed to meet users' needs proving that such user-centred approach is effective to ensure engagement. The inclusion of 3D modelling as a way to develop digital and critical thinking skills connected to heritage has been confirmed only in one occasion and, despite being in line with the finding of the first pilot, would not represent a reasonable sample.

The second research question (*How can heritage MOOCs create educational links between higher education and schools, to promote cultural heritage literacy in geographically dispersed communities?*) has been addressed by the successful conclusion of this research study. The opportunity for collaboration would not have been offered otherwise, as schools usually engage with universities located in the geographical proximity. Moreover, Professor Fugaro expressed an interest in developing additional sustainable and long-term collaborations on other heritage topics. However, it has to be noted that some of the issues encountered might have been mitigated with a better-designed approach. For example, a reduction in the hours of the placement was never considered during the planning that has led to, in some

respect, a rashed end of the placement. Only the students who really committed to the placement have interacted until the end, providing helpful feedback.

Finally, with regards to answering the third question (*How can heritage MOOCs engage 'local' communities, in particular via secondary schools?)*, the service-learning component was explicitly designed to connect the students to their local community. The creation of new heritage texts in English to describe local monuments has undoubtedly contributed support for tourists, who can use the information during a visit. It also benefits the general public. The translation in Italian of MOOC resources also services the wider Italian community. It was noted that 23% of the students participating feel more connected to their local community as a result.

The inconsistent written feedback received by the students and engagement can be recognised as one of the major limitations of this pilot. It can be argued that the data collected is positive but possibly inconclusive given the small sample analysed, and further research should be conducted to validate the results obtained.

Chapter 7   The Future and Next Steps in a Pedagogic Approach: Creation of an Internationalised Course

With a broad overview of the outcomes from the two case studies, this thesis proposes a new and sustainable way to reuse digital material that was initially created for MOOCs to integrate compulsary school education in Italy (Figure 91) via the curation of existing content, the provision of translations and the support to learning (e.g. analysing limits of the platforms and interaction between information).
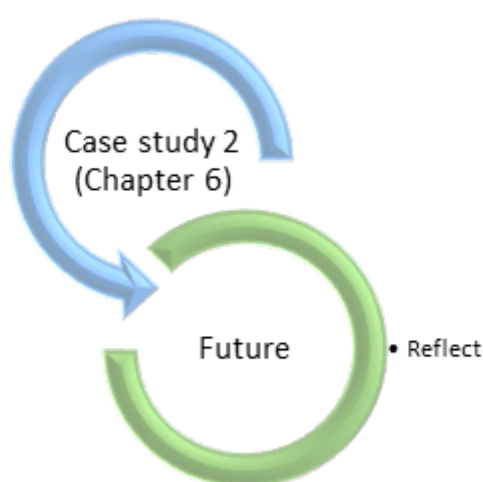
Figure 91 An image of the Action Research cycle. A reflection on the second pilot
supports the development of the proposed future plan.

With the Portus Portal, I intended to create a curated visual and open repository of resources facilitating the browsing access to some of the content produced for the MOOC and its translations which could be adapted by italian teachers to integrate into the compulsary curriculum using methodologies such as CLIL and work placements. Students can also access the content with their preferred navigation (linear through a time line using the link to the Portus tour or by topics).

In this thesis, engagement does not only mean making the collection accessible or reaching out to an audience, but it also aims at creating a template that can be used and adapted to meet different local needs. In this chapter, I will review the potential and limitations of the pilots presented so far and the future developments that could lead to open the content, further addressing the following research questions: *2) Can such heritage MOOCs increase access to education content amongst secondary school*

students? 3) How can heritage MOOCs create educational links between higher education and schools, to promote cultural heritage literacy in geographically dispersed communities? 4) How can heritage MOOCs engage 'local' communities, in particular via secondary schools?

7.1 Limitations

It must be noted that several limitations have to be considered in future research. The following is a summary of these limitations:

Some of the decisions taken while planning the two case studies were impacted by the FutureLearn state of development. This research was carried out before many features were developed on the online platform which now exist:

- o in particular, the need for subtitles in different languages in the videos has been one of the main drivers to choose a different platform such as Vimeo for the first pilot. However, although the availability of subtitles in different languages has now been implemented, English remains the main language for the majority of the MOOCs on FutureLearn. The following explanation was given on a blog post (Earl, 2014b) by a learning designer at the University of Southampton:

"I'm sorry to pour cold water on this idea, but following an in-depth debate with FutureLearn I can confirm that it will not be possible to support Italian for this run of the Archaeology of Portus course. As Graeme says above, Futurelearn is open to the idea of international-language courses, but there are significant challenges that need addressing first. For example, although it would be simple to have transcripts/translations for videos and articles, there is no mechanism to support quizzes. In addition, moderating multi-language comments would be a huge challenge.

For these reasons, we regret to say that Italian will not be supported in this first run of the course, and Futurelearn will continue their policy of deleting any comments that are not in English." (Warren, 2014)

> While this could facilitate conversations using English as a lingua franca, it could also represent a barrier to some Italians that do not speak English at all. Learners are still requested to post in English as the FutureLearn moderators as still working in english (FutureLearn, 2018)

- The open steps were made available by FutureLearn only in May 2015, after the second run. Despite this functionality, the platform did not introduce subtitles in multiple languages until 2017, too late for the first pilot, and the main corpus of each webpage is still available only in the main language of the course.

- As noticed in Chapter 6, due to changes in legislation that have reduced the hours available to students for their work experience, not all activities initially planned were completed by the students, thus not allowing a full comparison between them. However, data from their completed projects, in addition to conversations with the teachers, demonstrated how students had met their learning objectives.

- The case studies presented involved small numbers of students and aimed to function as a pilot for a larger scale testing. However, the constant changes in Italian governments created an unprecedented number of changes in a small period of time. Attempts to create job stability for teachers with la Buona Scuola reform has instead created a more unstable system where many are moving from one school to another at the beginning of each academic year with short notice. In August 2017, there have been over seven thousand vacant teaching jobs for a September start within the compulsory schooling system in Lombardy (Splnews, 2017). After two years the situation has not improved at all and the vacant jobs, mainly in math, science and English, in the same region have risen to fourteen thousand (Monaci, 2019, Santarpia, 2019). The main issue is connected to the fact teachers in more northern schools are requesting to be moved closer to their home town once they are allocated a permanent job. This makes broader testing more difficult within the timeframe of this research as many classes will start the academic year with temporary covers not interested in participating in the pilot. However, the outcomes have informed improvements, making the resources more accessible, and that could be considered to be applied in future research.

- The lack of administrative systems on the Portus Portal creates a dependency on the developers to add any additional information. The development has been piloted on a small scale (Figure 92) and the rollout to all current web tours — including the Portus Portal — is planned in the foreseeable future, but a timeline has not yet been set.
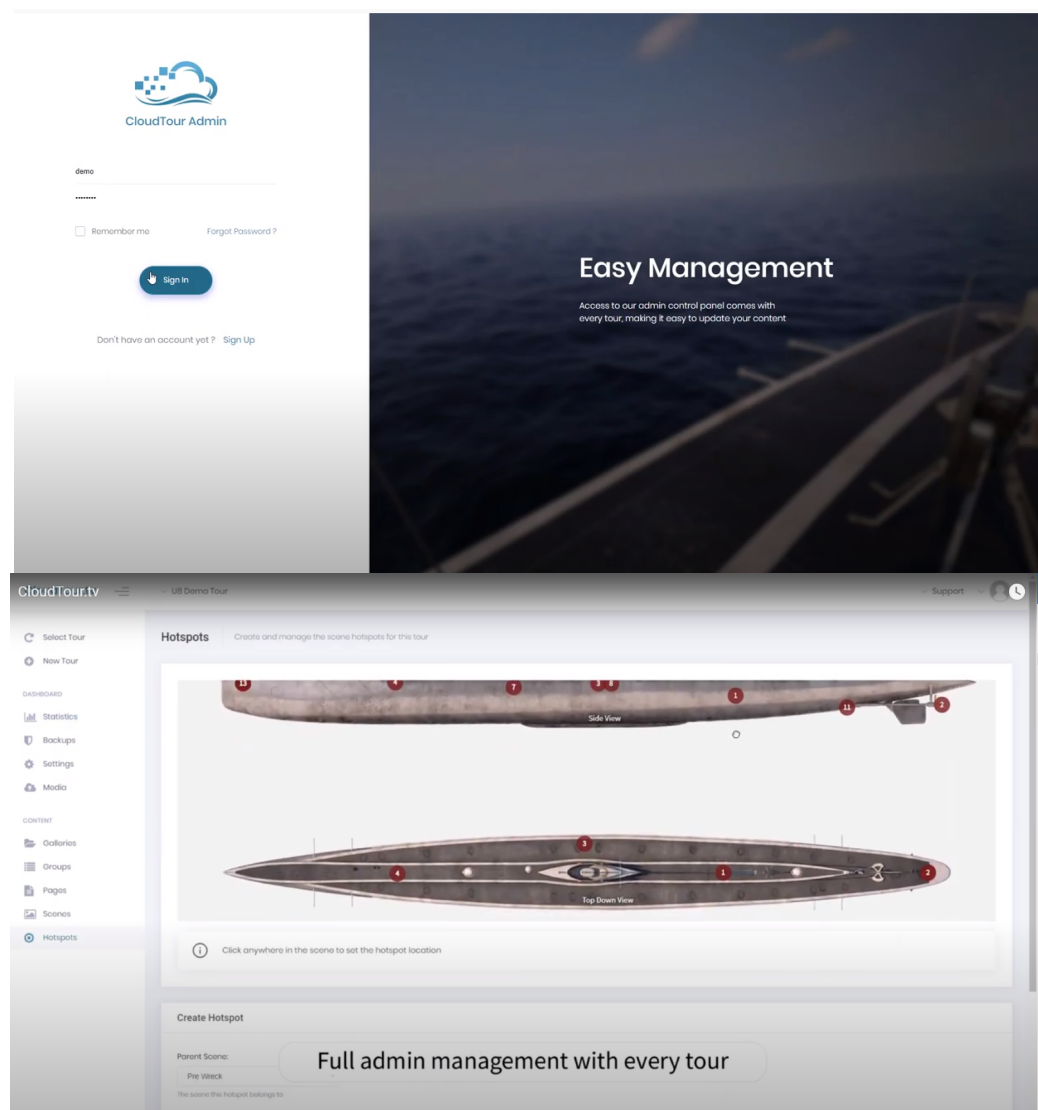
Figure 92 An image of the CloudTour administrative system.
(https://www.youtube.com/watch?v=rfV3zxlex8Q)

- The new functionality would allow users to create individual logins with different levels of permission to add their own information and resources similarly to what happens with websites like wordpress, transforming the tour into a real collaborative environment. This would give full independence to the users to quickly amend or update the content in response to users' needs. In the Italian school context, an administrative system with such functionalities would allow students to contribute directly to the platform.

  Currently, the use of metadata to dynamically import the content form the main websites (Flickr, Blogs, Vimeo) reduces the dependency on the developers.

- The initial lack of meaningful analytics connected to the Portus Portal has limited the information available on the learners' journey across the site. The

246

developers have now included analytics, as per April 2020, to map how users navigate the content to inform future improvements from a technical and educational perspective. Miyakita (2017) has demostrated how this type of information could be used in MOOCs.

- While this research was initially taking place looking at the content of a MOOC within FutureLearn, there are different platforms (e.g. Coursera, Udacity and others) with approaches and structures that differ from the one taken as an example. However, the new framework proposed can be generalised and applied to any other content, platform or on its own. Therefore, future research should consider a broad range of integrations following teachers and students' needs.

7.2 Accessibility and Openness

To enable access on a global scale, the content should be accessible, open and discoverable. Accessibility in terms of the language used has been analysed in detail in the second chapter when discussing SMOG and Gualpease analyses. A comment on the last run of the MOOC has shown how translations are used by the rest of the community to practice Italian:

"I wonder why the Italian transcript doesn't mention sailors making sacrifices. It's very good practice trying to make sense of it, I've also been studying Italian, so I love that these are included. Takes ages, though!"

An appropriate training provision could easily mitigate the language issue (Barel-Ben David et al., 2020, Fargo et al., 2020), linking nicely to existing practices of public archaeology (Grima, 2016) and in the wider educational context (Lambert, 2020).

Figure 93 An image of accessibility settings on the Portus Portal platform.

The Portus Portal was conceived as a visual resource; this might limit learners' access, and especially those with visual impairments. The platform already maximises the images and videos to minimise the impact of broadband performance, as illustrated in the previous chapter. However, additional settings (Figure 93) have been included to support accessibility across different devices and operating systems. Furthermore, additional research should be conducted to test and improve some of the emerging limitations in this area, such as the preparation of audio descriptions for each menu item, and the use of different navigation devices such as a phone or tablet.

Although this research did not primarily focus on establishing a new technical solution, which was developed as a result of the first pilot, there are still considerations to take into account when planning the next steps. While the portal has been planned as a new way to access the information and as a linking interface, there is still a question of how well it does integrate with the already existing platforms. A new virtual museum functionality, created to support virtual underwater tours, linking 3D objects uploaded on Sketchfab directly on the platform has been implemented (Figure 94). This addition democratises the 3D model creating an effective 3D user interface (Bowman et al., 2007), allowing learners to interact with the 3D objects in a different way (e.g. turning it around or zooming on a particular area). This goes beyond the initial purpose of this research, but it could be considered in future developments. Given the fast-paced technological advancement we are experiencing, and the most recent discussions about open data in academia and heritage practitioners (Fredhem, 2020, Medeiros e Sá et al., 2019), we can only anticipate a growing number of resources available on the web.
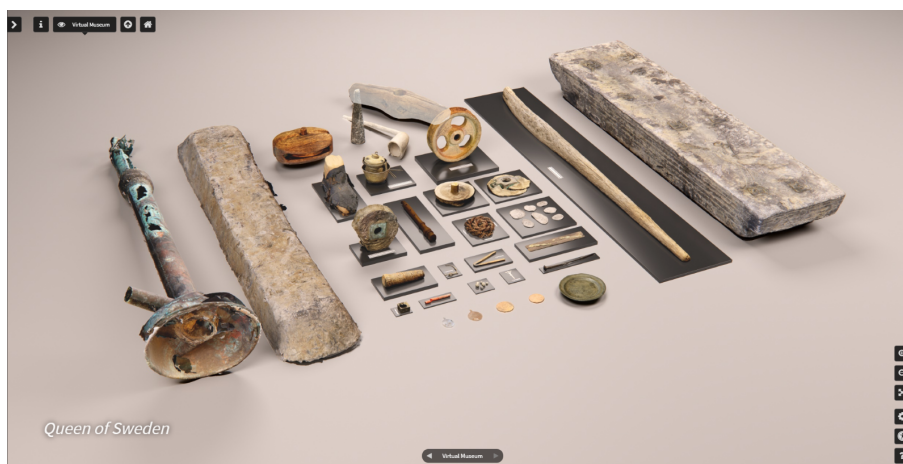

Figure 94 This image shows the Virtual Museum development on the Queen of Sweden's CloudTour site. This functionality is still in development and not yet publicly available. The Virtual Museum, linked to the main navigation, allows users to select individual items and to explore each of them in 3D.

Even though this research aimed to test the reusability of material and not in preserving or archiving the primary or derivative resources, long term sustainability should be considered. At this stage, it is still a big challenge as the information contained on the blogs and websites have not been archived by the University of Southampton in any way. The potential to have the blog deleted once the project is completed is real, as is the risk of having the content hosted on FutureLearn deleted. The university library is currently exploring how the content could be preserved and made accessible, with an appropriate licence, through its library catalogue. Structured metadata, such as The Dublin Core Standard, TEI or Digital Objects Identifier, should be adopted to make the data openly available. A similar approach should be adopted for Learning Objects that can be stored in repositories such as LearnAlberta[149] or OpenStax[150] or being discovered through aggregators such as Adriane[151] or Open Educational Resources Commons[152].

In addition, the opportunity to use Linked Open Data should be applied to online resources. This concept was introduced in the Humanities, and in particular in association to the Roman period, in 2009 by Elliot and Gilies and that was then developed by Pelagios (Isaksen et al., 2014, Simon et al., 2016). The Pelagios project proposed to use the Open Annotation Ontology, which describes an annotation comprising a target URI representing a fragment or the whole document and a body representing its content (Sanderson et al. 2013). Pelagios requires each URI to refer to a place defined in digital gazettes, a structured index of geographic place names (Horne, 2020), such as Pleiades or Geonames. This simple connection allows the exploration of information across a corpus of data and projects while exploring open annotations created by individual source providers (Isaksen et al., 2014). Each object could not only be linked in the gazetters, but also to the 3D models.

Another aspect to consider in open-access resource creation is Wikiversity. Wikiversity is a project developed in 2006 to support learning communities by offering tutorials and educational material and, like Wikipedia, is available in many languages. The first open course on the platform was organised a year after its creation, to test the platform as free and open (Kumar, 2020) and to explore how educational activities could be conducted in a 'learning by doing' model (Dewey, 1997), similar to the Action Research methodology (McPherson and Nunes, 2004: 13-16) explored in this thesis. Lawler

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[149] https://www.learnalberta.ca/
[150] https://openstax.org/
[151] https://www.ariadne-eu.org/
[152] https://www.oercommons.org/

(2008) analysed the way wikis in Wikiwersity facilitate community learning using Action Research. Despite recognising the educational potential of the transparency offered by wikis, Lawer (2008) suggests more research in this area should be conducted. The possibility of using Wikiversity or Wikipedia for the second pilot was excluded as the students were under age at the time. In addition, work placements require an evaluation of the progress against the set learning objectives that would have been difficult to assess if the students used an alias on the wider web. On the contrary, the pupils are also losing the opportunity to build a relationship and relate with others outside their classroom or background and have an international experience.

7.3 Digital Sustainability and library partnership

This research project has not only demonstrated the potential for the reuse of the material in a different way, but has also emphasised some of the weaknesses connected to the development of learning content that is sustainable over time.

Digital preservation is a concept that originated at the beginning of 2000s, and developed side by side with digital libraries and digital curation with the increase of digital-born resources produced and shared. The concept has been defined with a series of nuances by different practitioners based on their professional standing. Bradley (2007: 151) suggested that although digital sustainability is usually used in place of digital preservation and "it encompasses a range of issues and concerns that contributes to the longevity of digital information", it has only been on one technical concern after another. Stüermer (2004: 1) expanded this to define it as the practice to "create, use, and regulate digital resources in order to maximise their value for our society today and in the future"; while Stuermer et al. (2016) extended the concept of sustainability outside the resources' ecosystem into the production, development, maintenance and access to digital artefacts that support the creation and usage of digital artefacts and archives. Similarly, Konstantelos and Hughes (2019) explored digital preservation, considering the overall life cycle to preserve culture, history, heritage and humanities through digital technologies. Meanwhile, George et al. (2020) investigated how digital sustainability could contribute to the longevity of knowledge and information within organisations to enhance productivity and performance. In this respect, I am here using the term 'digital sustainability' to include aspects of digital curation, archiving, and sustainability.

Despite differences in definitions and perspectives, scholars advocating digital sustainability all agree to the importance of preserving information to meet the needs of

250

future generations through advocating the longevity of digital information (George et al., 2020; Stuermer et al., 2017; Digital Preservation Coalition; 2015; Stürmer, 2014; Bradley, 2007) in line with United Nations priorities (1987: 9; Sengasavang, 2020). Libraries and Archives have responded by developing this area as one of their distinctive subfields (Library of Congress, 2002), focusing on preserving digital information. The involvement of practitioners with specific knowledge of curation and preservation helped drive digital preservation forward (Conway, 2011), combining policies and strategies (American Library Association, 2008) with the offer of support through the development of institutional repositories such as DSpace and Eprints (Lynch, 2003).

In the context of education, while proprietary platforms and tools can create consistency in pedagogical approaches across the courses and support the educators in the design process, the long term availability of content remains an issue that can impact the users and scholarly and academic recognition of digital work (Pomerantz, 2018). A few examples to illustrate the extent of this issue in heritage MOOCs have been discussed in the first chapter (Chapter 1.6.2), which include the application used to offer different visualisation integrated with the *Hadrian's wall* or in the *Archaeology of Portus* course, that is not supported by the latest web browsers, and the content of *Archaeology's Dirty Little Secrets* that is not available on Coursera. In addition, the use of specific software that requires a licence, such as Articulate Storyline in *Using aerial photography for archaeology heritage management,* or the production of computing-intensive 3D models, such as the one used in the *Rome: A Virtual Tour of the Ancient City,* also limits the long-term sustainability of resources. The challenges connected to the increase use of third party-services (e.g. YouTube and Flickr) approach to share education resources (van Dijck, 2013: 131) have been discussed extensively in the first chapter. Despite concerns raised by librarians on the longevity of the resources hosted on such platforms, a survey conducted by the Centre for Academic Practice and Learning Enhancement (CAPLE) and the Centre for Educational Technology and Interoperability Standards (CETIS) at the University of Strathclyde in the United Kingdom on the involvement of libraries in OER programmes has shown that only one fifth of the respondent confirmed the library assisted with the preservation (Bueno-De-La-Fuente et al., 2012). It does not appear clear if the increased use of such providers is a consequence of the low library engagement with the programmes or if the library was never involved in the conversation.

The instability of digital resources that would "*suddenly disappear*" or "*stop being supported*" (in the case of apps) at the end of a research or educational life cycle is not

impacting only online course, but also the use of such resources into face to face teaching. A recent research project, led by the author, investigating practices in teaching undergraduates with primary sources, has seen the unreliability of digital resources as the most frequent challenge cited by academics at the University of Southampton interviewed (Atkins et al., 2020). Poor digital sustainability could be related to inadequate infrastructure (Adams and Ngimwa, 2012; Brooks, 2014) or to other external issues, such as a blackout or a change in university staff, that can cause unintentional discontinuity in the digital collection (Meneses, Furuta and Sipman, 2012; Pomerantz, 2018).

With the development of technologies and the expansion of the field, the shift has moved from the focus on definitions to the development of a life cycle model of curation and preservation (Gracy and Kahn, 2012; Johnston, 2017), considering the development of appropriate infrastructure (Wilson et al., 2010; Bicarregui, 2016), metadata (Lavoie and Gartner, 2013; Dappert et al., 2016), ontologies (Gelernter and Lesk, 2011; Mayer et al., 2015; Kontopoulos et al., 2016) and new materials that could be preserved, such as videogames (Hudgins, 2011; Carta, 2017; Carpented, 2020) and 3D objects (Doyle et al., 2009; Moore and Kettler, 2018; Hardesty et al., 2020).

Moreover, the development of the Electronic Resource and Preservation and Action Network (ERPANET), supported by the European Union, and the establishment of the Digital Curation Center and the Digital Preservation Coalition at the beginning of the 2000s have increased the support for the preservation of artifacts (Ross, 2004) while offering resources for digital preservation and curation open to researchers and educators (Digital Curation Centre, 2020). Similarly, other digital repositories such as the Archaeology Data Service[153] and OpenStax[154] have hosted archaeological research outcomes for over twenty years or stored learning materials created for e-learning (Roy et al., 2010). An additional option is presented by the aggregators such as Ariadne[155] or Open Educational Resources (OER) Commons[156], which are only storing the metadata linking to the original source to facilitate discovery rather than preserve the file.

[153153] https://archaeologydataservice.ac.uk/

[154] OpenStax (https://openstax.org/) is an open source platform to create peer-reviewed, openly licensed textbooks.

[155] Ariadne (https://github.com/ariadne-eu) created a standards-based technology infrastructure that allows the publication and management of digital learning resources in an open and scalable way.

[156] OER Commons (https://www.oercommons.org/) is a public digital library of open educational resources.

In this context, the work conducted by #dariahTeach can be used as an exemplar of how users' needs can inform the creation of sustainable digital educational resources. The developed solution is modelled to meet students, teachers and also administrators requirements as a structured (as part of a University course) or unstructured (individual access on the #dariaTeach platform) (Wissik and Ďurčo, 2016: 10). Content such as videos and interactive media are hosted in a different open platform, metadata is shared using OER Commons and the copyright, and licencing is clearly associated with each resource. However, it is unclear what role libraries might have played during the development of the infrastructure and in the definition of the sustainability plan.

Concerning the Archaeology of Portus case study and in the context of the partnership between the University of Southampton and Futurelearn, the initial Memorandum of Understanding does not include information on the migration to a different platform in case of a change in strategy and do not include information on repositories[157]. This implies that the sustainability of content was not considered as a priority by FutureLearn while developing the platform and that remains the responsibility of the creator of the content.

The outcome of this research has offered the author, as a library practitioner, the opportunity to reflect on the ways in which digital resources are developed, made available to users, curated and preserved. It also allowed to rethink the way in which online courses are supported by the institutions and create new partnerships with academics and colleagues based in the IT department. A new policy supporting the development of Open Education Resources at Southampton has been drafted as part of a wider Digital Education policy and is now in a phase of implementation. One of the significant changes has seen the creation of workflows to revise live content and cataloguing of learning objects and digital educational content created for MOOCs co-designed by the library, faculty and IT service. This is leading to more efficient version control and archival of outdated content, increasing the quality of the educational content available online. In addition, conversations about the creation of a consistent and comprehensive archive of all the digital content created to promote MOOCs are ongoing. The preservation of blogs, websites and data from social media is a current priority given the current migration of some unsupported University of Southampton web platforms into supported options. The size of the files, especially the one related to 3D models, could represent a limit to reuse as it could impact the online interacting (e.g. be slow to render or have a slow response to user interaction) or download,

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[157] The author had the opportunity to access the institutional agreement.

especially in areas with low internet bandwith. The approach developed by Nicholls (2019), who developed simplified versions of the 3D model of Rome and devided them in sections available on SketchFab, is the suggested way to allow users to experience the model of Portus's Harbour. This simplified accessible version would complement the complete model that would be archived separately following the Archaeology Data Service's guidelines.

As discussed throughout the thesis, there are several barriers to successfully creating accessible and sustainable educational resources. This should be the responsibility of every part of the community of researchers and practitioners in this field and be strongly related to the decision made during the planning and developing process. The table below (Table 18) summarises areas where sustainability can be improved, devided by themes and provides suggested actions and solutions researchers and practitioners could apply to their context. However, the author recognises that creating a university-wide policy requires a particular level of institutional commitment and technical expertise that might not be available in all institutions.

THEMES	SUGGESTED ACTIONS
Creation of sustainable resources	Development of an institution-wide approach to digital preservation of learning objects (if not already available at the home institution). Communicating institutional practices and priorities clearly in a formal policy before the creation process begins is ideal to clarify expectations, benefits and responsibilities. The adoption of policies will increase the level of consistency across the organisation. Educators are suggested to engage with the library to discover if a policy is already available at the home institution
	Include digital preservation experts (e.g. archivists and librarians) in the conversation ongoing while developing an online course. Including them from the planning stage could mean that metadata, format, and repository functionality are considered from the outset.
	Minimise the use of proprietary software used where possible and prefer open or widely adopted solutions. If proprietary software has been used, the content should also be saved and easily available to users in an open format.

THEMES	SUGGESTED ACTIONS
Increase access to content	Require compliance with the latest accessibility acts. It is suggested to design accessible educational resources from the beginning instead of trying to make existing resources accessible after the fact. This could impact decisions related to the tool or the software used.
	Improve metadata by sharing a ReadMe file. This would give future readers and educators additional context while also documenting the decisions and resources used during the creation of the learning object of specific components.
	Adopt the most appropriate repository (e.g. EPrints, Archaeology Data Service, SketchFab) or establish links to archives for the content hosted on third party-services (e.g. YouTube). In the case of 3D reconstructions, simplified models might need to be generated specifically for online and or streaming distribution of 3D content. The International Image Interoperability Framework (IIIF) offers a possible avenue for exploring standardised access through the development of specifications to support 3D use cases.
	Schedule periodic review of the policies in place and what kind of educational resources are being created. This could support the development of more flexible resources that can be adapted to different pedagogical approaches.
Facilitate reuse of heritage content	Include copyrights/licences to each resource created, including the version or the date of the latest update. Prefer open sources or free tools; when not possible, explore the use of software well established in the sector. For example, the use of Articulate Storyline to create learning objects or SketchUp to create 3D models.

Table 19 The table supports researchers and practitioners offering solutions on how to improve the sustainability and facilitate the reuse educational resources.

7.4 Internationalisation

When discussing internationalisation, most of the research since the late '90s focused on the higher education (Bennell, 2020) environment. International student mobility and off-shore provision (sometimes recognised as transnational education) have been the

most explored way to foster internationalisation (British Council, 2013; Ileva and Peak, 2017; McBurnie and Ziguras, 2007; McNamara et al., 2013; Healey, 2013). However, while the impact of Brexit on the British educational system has been discussed and examined since 2016 (Celsian Education, 2019; Highman, 2019), the current coronavirus pandemic is pushing the entire educational system to accelerate the digital shift (UNESCO, 2020a; UNESCO, 2020b; World Economic Forum, 2020). Now, more than ever, there is a need for digital open educational tools that can facilitate the internationalisation of the curriculum at home.

In England, the idea of internationalising the curriculum is well known, with 47 independent schools that have established an overseas location at all pre-university levels (from nursery to secondary). The Translocal Educational Enterprises (TEEEs), as they are also known as, created a link fostered by exchanges between the UK based schools and the schools that are in a different location (Hu et al, 2019). Additional opportunity for partnerships at school level is offered by the British Council via the Connecting Classroom Programme[158], which is looking at core skills in critical thinking and problem solving, digital literacy, communication and collaboration, citizenship and creativity. However, this programme is suitable for 8 to 14-year-olds pupils showing, once again, the gap this research is addressing.

In the meantime, in 2019, the Italian government has proceeded to recruit 120 experienced teachers to promote the diffusion of new teaching methodologies, the creation of innovative learning environments in schools, teacher training, and the detection of best practices already present in the country. The teachers would be seconded for two years to promote and develop digital teaching projects, digital citizenship, digital economy, and media education across Italy (MIUR, 2019).

7.5 Future Development

Learners have commented on the length of the MOOC during the course, where some of the comments suggested changing the initial communication to a more realistic timing. The initial weekly length was suggested as four hours and then revised to a longer period. Almost 30% of learners leaving the course suggested time was a constraint for them (Figure 95).

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[158] https://connecting-classrooms.britishcouncil.org/sites/default/files/media_literacy_resource_-_accessing_analysing_and_creating_media.pdf
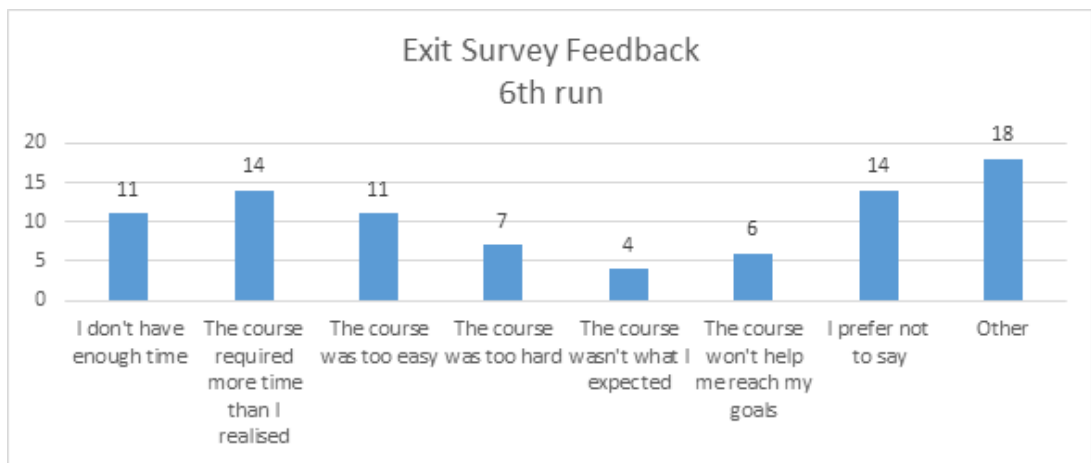
Figure 95 A histogram showing feedback from the exit survey. Data was available only for the latest run.

A new revised version of the MOOC will be developed in the future, when the current phase of publication of the Portus research is complete and is suggested to address the time concern and to allow the activities to better fit with the schools' needs. The data relating to comments on each step has also shown that the first two weeks are the ones where learners have engaged the most (Figure 95). The newly revised course structure is suggested to follow a reduction from six to three weeks to include only the resources utilised during the pilots and some additional activities that presented high engagement on the MOOC as "core resources", moving from 129 to less than 50 steps. The additional steps could be clearly marked as "further activities" and still be made available outside the main MOOC structure to maintain the open digital scholarship agenda the course embraced from the start and to ensure re-usability.
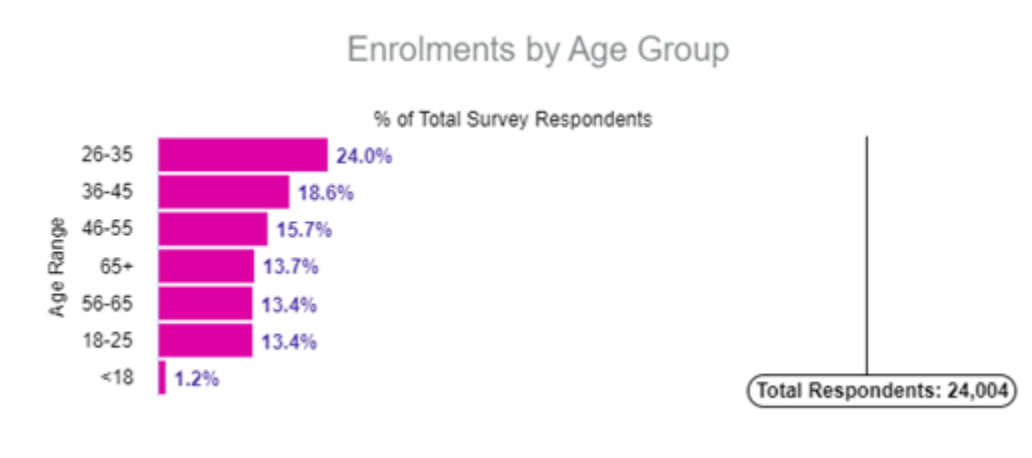

Figure 96 FutureLearn statistics on enrolments between January 2017 and December 2019.

The number of under-eighteen-year-old learners enrolled on FutureLearn remains quite low (at the time of writing, Figure 96)[159], questioning if this platform is the most appropriate to engage that particular demographic. At this stage, I argue it is not, and the Portus Portal, given the positive feedback from students and teachers, could be improved with additional resources to continue the work with schools. It needs to be noted that in July 2020, FutureLearn launched a FL school platform to support students learning during the COVID pandemic. Teachers from primary and secondary schools are invited to register their class and use steps from any MOOCs part of the project free of charge until September 2020. Institutions can be part of this project by renouncing any revenue for that course, and no particular requirement for language readability score or learning objectives mapping is required. It remains unclear if the arrangement will remain the same after September 2020.
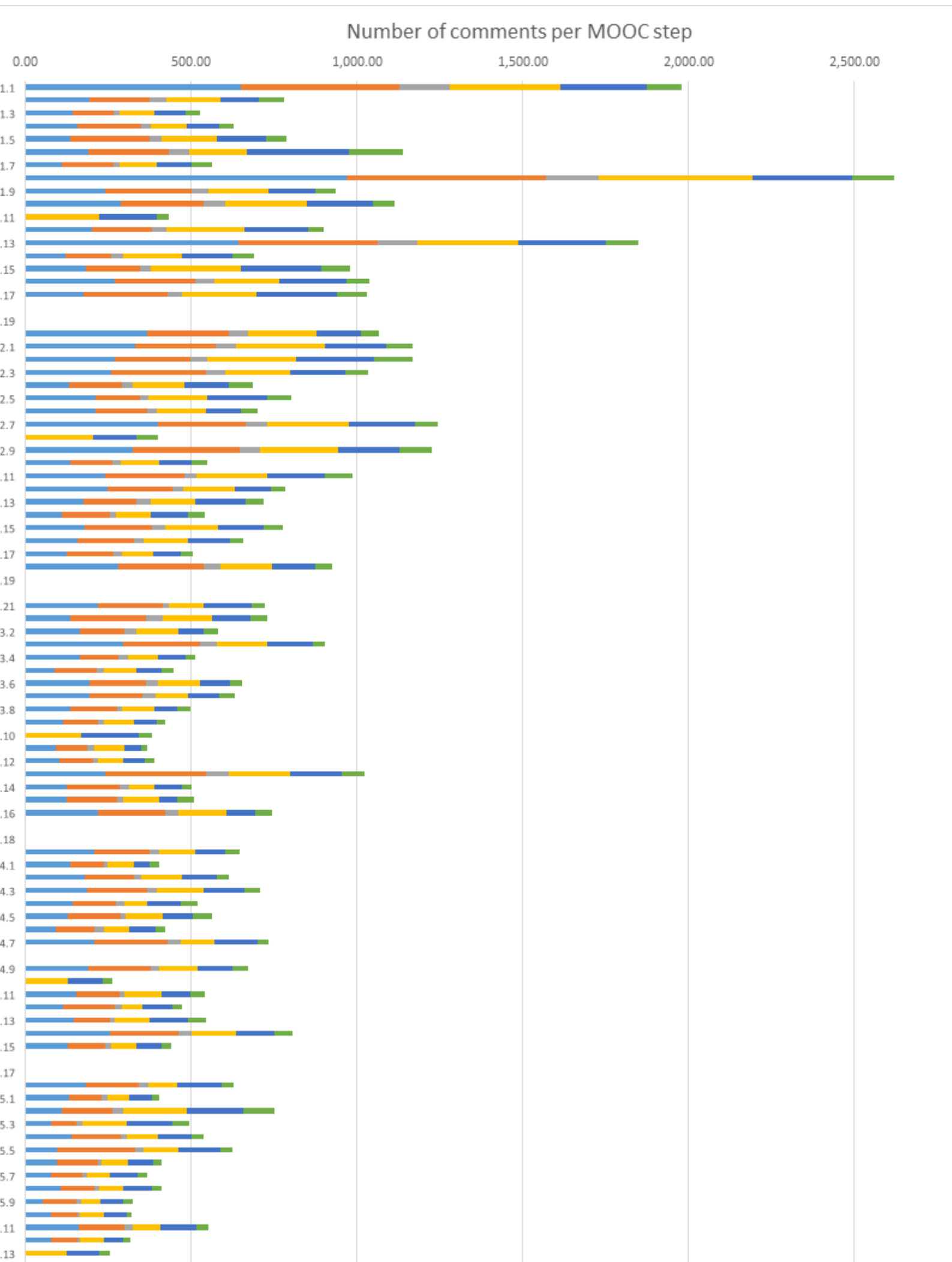
To fully demonstrate the wide range of applications, even outside the subjects already listed in Chapter 3, I have proposed the structure below, with an Italian literature module in mind, where students experiment with different writing styles. I have selected a number of steps from the MOOC based on the volume of engagement through comments (Figure 83) and the learning objective requirements for the Italian literature module.

While the content of the steps will remain the same and should not be edited, there will be a small number of steps/activities from the two pilots that could be included as activities. Some of the existing discussion steps could be used by teachers and students to experiment with different types of creative writing. For example, teachers could invite students to write a novel, a news article or a blog to experiment with different writing styles.

Week 1

This week would introduce Portus and its phases through the excavation discoveries. This would continue to support the first learning objective set for the MOOC (reflect on the site of Portus in relation to its geographical and historical context from current research) and second (provide an analysis of how archaeologists, together with historians and epigraphers, can unravel the history of the site of Portus). It would also continue to give chronological guidance to users that prefer a linear narrative. The steps include two activities where students are invited to write a story based on "*What*

was it like to arrive at Portus in the First Century AD?". This was one of the most successful discussions on the MOOC, collecting over 2600 comments (Figure 97). The additional activity invites students to compare different finds and what information is supplied to archaeologists. The style requested in this case is more analytical and descriptive.

Number of comments per MOOC step

ACTIVITY	STEP TITLE	STEP No.	ADDITIONAL RESOURCE?
Phases	The reason behind the construction of Portus and its relationship to Ostia	1.5	
	The Roman Empire in the Claudian period	1.6	
	The phases of Portus	1.7	
	The Great Basin of Claudius and the Portico di Claudio	1.9	
	The Trajanic Ports	2.1	
	The Roman Empire Under Trajan	2.2	
	Trajanic Expansion of Portus	2.3	
	Portus and Rome	2.6	
	Roman Empire in the later Second Century	3.2	
	Development of the port	3.3	
	Portus and the Roman World in the Third and Fourth Centuries	4.2	
	Later fifth to seventh century use of the port	5.2	
Discussion/ Creative Writing	What was it like to arrive at Portus in the First Century AD?	1.8	
CLIL	Share images of materials/buildings related to each phase using social media (Twitter/Instagram)		Yes
Excavation & Discoveries	The value of ceramics	1.16	
	Amphora Sherds from Leptis Magna	1.17	
	Brick stamps from Ocriculum	2.17	
	The brick stamp of Marcus Rutilius Lupus	2.18	
	Marble cladding	3.15	
	Uncovering the Portus Head	3.16	
	Nails and other metal artefacts	4.12	
	Bronze Constantinian coins	4.15	
	Byzantine Decanummus	5.1	
	Fineware	5.2	
	Excavation of the Imperial Palace	6.3	
Discussion Creative writing	Comparing finds	6.11	
CLIL	Share images of relevant materials from local contexts using social media (Twitter/Instagram), eg. Roman pottery, glass, etc.		Yes
Work placement	Translate some English text into italian text from the MOOC. Once you have translated the text, please visit the local museum and select one object or a building you are interested in your city and write a 200 words in english about it for tourists.		Yes

Week 2

The second week would be focused on building and computer graphics. This will offer the opportunity to compare buildings and create activities focused on developing practical skills (e.g. learning 3D modelling software) and to evaluate multidisciplinary methods and theories in the context of archaeological fieldwork (learning objective 4). The additional activity included was added to the online course on the fourth run. The task would give the opportunity to students to imagine themselves as a Roman and then as archaeologists to express knowledge and ideas of a place creatively and analytically. By comparing the two narratives, students would need to apply their critical thinking.

ACTIVITY	STEP TITLE	STEP No.	ADDITIONAL RESOURCE?
Buildings	Terme della Lanterna	2.11	
	Grandi Magazzini di Settimio Severo	3.7	
	Building Five - a possible Navalia	4.11	
	Roman buildings and methods	4.7	
	Basilica Portuense	5.5	
	What has the excavation of the Imperial palace told us?	6.2	
	Building three	6.4	
	The amphitheatre	6.5	
	The castellum aquae	6.6	
Discussion/ Creative Writing	Comparing interpretations	6.12	
CLIL	Research and share images of materials/buildings related to each phase using social media (Twitter/Instagram)		Yes
Work placement	Write up to 200 words in English on how the building you have identified in your hometown is similar to the one in the video.		Yes
Computer Graphics: Reconstructing Portus	Photogrammetry and laser scanning of artefacts	4.9	
	Reconstructing Building 5	4.9	
Activity – CLIL/work placement	Use of SketchUp to build a personalized reconstruction of one or more of the buildings		Yes

Week 3

The last week of the course would be looking at the Roman trade network. The last week will cover topics like globalisation, the types of cargo imported and links to other ports while looking at the ranges of data, techniques, and interpretations currently employed at Portus (learning objective 3).

ACTIVITY	STEP TITLE	STEP No.	ADDITIONAL RESOURCE?
Roman Trade Network	Links to other Ports	1.12	
	Globalisation	1.13	
	The types of cargos that were imported through Portus	2.7	
	Marble and the Mediterranean	3.14	
Discussion/ Creative Writing	Study group activity: Shipping and ships	2.8	
	To what extent can we apply a concept like "globalisation" to the Roman world?	1.13	
CLIL	Share images of materials/goods imported or exported via the Roman Trade Network using social media (Twitter/Instagram) and compare globalisation of Roman and modern worlds		Yes
CLIL/work placement	Use of 123D catch to build a 3D model of artefacts		Yes

The suggested structure would help teachers to structure activities in a limited time frame working on self-contained modules designed to support the development of both knowledge and skills. As well as considering how best to adapt these materials to suit the needs and abilities of each learner, teachers are encouraged to think about how to apply learning to its best effect in the context of their particular community and the national curriculum of their country. The activities should be seen as part of the curriculum and not only an add on.

All of the new content will be accessible via the Portus portal, including the translations created by the students in Milan and the activities created for both pilots. In this case, the platform will link to documents on a google drive folder. However, the Portal does not offer the opportunity to create a genuinely international community supporting the internationalisation element discussed in the previous chapter as FutureLearn does. An alternative would be to integrate the activities with structured social media elements where students could build their own international community.

7.6 Concluding thoughts

This chapter started with a review of the pilots and the emerging limitations, proposing how each of them could be mitigated where possible. The accessibility and openness of the content provided are also directly linked with their long term sustainability, which should not be taken for granted. While some of the issues identified can be mitigated, there is the need for an integrated approach to the preservation of digital resources. Pomerantz (2018) invites faculty, librarians and IT staff involved in MOOC initiatives to be accountable for the development of an essential partnership to ensure long term preservation of educational content as a digital collection of the intellectual output of an institution.

The Portus Portal still remains a valid complementary tool to FutureLearn, that — pre-pandemic — is still not attracting the demographic this research aims to engage. A new structure for the course has also been suggested to facilitate the reuse of resources in a school context. The reduction in the number of steps, or the creation of a step specifically designed for repurposing, would allow students to focus on well-defined concepts and facilitate teachers' reuse of the content to fit the class better. Futurelearn has developed a more specific area and approach as a result of the current pandemic, despite the many limitations, but it is unclear if FutureLearn schools will be maintained after September 2020. The opportunities provided by the wider application of readability test, multi-language content across the entire FutureLearn courses and the opportunity to easily pull steps from different courses to create a differently curated pathway would provide the flexibility and scalability teachers' need. Moreover, the Archaeology of Portus MOOC benefits from the creation of additional crowdsourced material (translations or new information) connected to the main course in a sustainable way. Resources are linked to the Portus Portal and, therefore to the Archaeology of Portus MOOC automatically via metadata and open folders set in partnership with the schools.

The new suggested structure builds upon the existing MOOC resources extensively analysed in the two pilots presented in Chapter 5 and 6 to address the first research questions (*Can such Heritage MOOCs increase access to education content amongst secondary school students?*). The proposed solution, which is presented here only as a hypothesis for further development and as a model for other Heritage MOOCs, takes into account Italian literature, a subject that in Italy allows students to practice and experiment with different writing styles, similarly to the creative writing modules in England.

The second research question (*How can heritage MOOCs create educational links between higher education and schools, to promote cultural heritage literacy in geographically dispersed communities?*) can be been addressed with the inclusion of activities developed as part of the CLIL and work placement/service-learning pilots to the proposed structure. The inclusion of such activities in any future development supports the creation of shareable best practices amongst teaching staff that could independently tailor content available to best support students' development.

Finally, with regards to answering the third question (*How can heritage MOOCs engage 'local' communities, in particular via secondary schools?*), the additional activities connected to specific steps are designed to connect the students/learners to their local community via Service Learning.

Chapter 8 Conclusions

> *"The greatest sign of success for a teacher... is to be able to say,*
> *' The children are now working as if I did not exist.'"*
>
> *Maria Montessori (1949)*
>
> *"I think that this course is a fascinating cultural journey where the traveller/learner can go*
> *ahead or back reflecting on the most meaningful topics."*
>
> *MOOC Learner's comment*

This thesis is grounded in the interdisciplinary field of Digital Humanities, combining two distinct approaches, the public engagement approach common within archaeology and the broader heritage sectors (open digital heritage), and the investigations of educational theories and practice (CLIL, blended learning and service-learning). The adoption of MOOCs in higher education institutions of a variety of topics is making new learning content available to worldwide learners while offering opportunities to engage communities not otherwise represented on the learning platforms. Specifically, in the cultural heritage sector, there are still a majority of colleagues communicating to the public that their narrative and method of delivery is the only acceptable approach (Kobiałka, 2014). However, since 2016 we have experienced an increase in online content focused on heritage utilising different pedagogical models, from online to flipped classroom and blended learning, and levels of interactivity (Nicholls, 2016, 2019; Pomrantz, 2018a; dell'Unto, 2017). MOOCs represent a way to open the content and information to the wider community while being ready to accept feedbacks and reuse of the resources and content in a different way. This zeitgeist has profoundly shaped the structure of this thesis, leading to the development of two distinct epistemological frameworks. The first involves educational methodologies applied to online content to test how cultural heritage information could be reused, whilst the second is a communication shift from an educational to a democratic communication model following Holtorf's (2008) way of thinking. These endeavours culminated in the development of the two pilots, where the outcome from the two approaches were brought together. Both cases are putting learners at the centre of the development.

The first chapter set the scene for the thesis, detailing different pedagogical approaches adopted in heritage MOOCs and the state of research on Portus. A brief excursus on the use of images in heritage as an independent and powerful medium more than a complement to a text (Perry 2011: 315; Perry 2015: 203; Smiles and Moser 2005: 2) and

on the use 3D modelling and interactive technologies in a research environment to better understand the record (Nicholls, 2019; Jensen, 2018; Haynes, 2017; Earl, 2013) has been included before exploring the use of such technologies in education to develop student digital skills and critical thinking (Nicholls, 2019; Dell'Unto, 2018; Pomerantz, 2018a; Derudas et al., 2016). Despite the historical importance of the area (Lugli-Filibeck, 1935; Impiglia, 2016), and the extensive research recently conducted (Keay, 2005; Keay et al. 2005), it is a site that is not well known amongst the Italian community. Moreover, the site is often represented misleadingly in children's books and is almost absent from the study books used in compulsory education. In Chapters 2 and 3, I introduced the Archaeology of Portus MOOC structure, and language analyses and where cross-references to other online courses were introduced, showing a bias from archaeologists' voices and demonstrating how content can be reused. Similarly, translations in Italian have made the content available to a different community, but have carried a bias from archaeologists' voices and from myself as Italian representative in the Portus project. I then illustrated the similarities between the English and Italian systems that made them comparable for this study. With the changes in English educational policy that led to the interruption of some subject-specific courses like archaeology (Ofqual, 2017), the opportunity to introduce students to heritage topics in a different way, as suggested by Henson (2016), was created. The Italian education system has an interdisciplinary approach at its heart (Looney et al., 2005), and the most recent *Buona Scuola* reform (Law n. 107, 13/7/15) has put the development of soft skills (e.g. language and citizenship) work placements into the spotlight. The educational methodologies discussed in this research have been individually analysed by different scholars and applied by both systems to pre-16 or within the higher education environment (Eurydice, 2006, Bosisio, 2015, Wald et al., 2009, DfE, 2015a, NatCen, 2017, Tino and Grion, 2019, Vigilante, 2014). None of the research focuses on the reuse of the same existing materials across all methods. This thesis aimed to fill this gap by combining the specific research problem of cultural heritage digital resources within the broader question of how resources created for MOOCs can be reused in different contexts. This led to the formulation of four research questions; 1) whether the digital content could be used as part of CLIL and blended learning activities by secondary schools; 2) whether the same content can increase access to education content amongst secondary school students; 3) the extent to which heritage MOOCs can link higher education and schools to promote cultural heritage literacy, and 4) determine the possible role played by secondary schools in engaging 'local' communities.

An outline of the overall research design for my thesis is shown in Figure 98 below.

	MOOC	Case Study 1 16-18 yrs old (CLIL)	Case Study 2 16-18 yrs old (Work experience)	Future development 16-18 yrs old (Creative Writing)
Cohorts	All Schools	Some schools	Some schools	All schools
Roman Focus	High	Medium	Low	Low to High
Learners	30,000	26	17	n/a
Interactions	Online	Blended	Blended	Blended
Direct Engagement	Low online, no F2F	High online, no F2F	High F2F, no online	Both
Creativity	Low	Medium	High	High
Complexity	High	Medium	Low	Low
Linear Structure	High	Medium	Low	Low
Chapter	4	5	6	7
Research Questions	1, 3	1,2,3	1,2,3,4	2,3,4

Figure 98 This schematic shows the overall research design following the different phases of this research. The diagram shows how the same resources used in different educational delivery formats (MOOC, pilots and suggested new development) with different levels of creativity (*Low* – no or limited requirement to use and demonstrate critical thinking and create new content and ideas independently; *Medium* – some requirement to use imagination and critical thinking; *High* – requirement to use imagination and creativity to solve practical problems), complexity and linearity (*Low* – no or limited structured narrative created/provided; *Medium* – some narrative created/provided; *High* – the educator/platform creates/provides a narrative structure learners are 'invited to follow'). Research Questions: 1) *Can Massive Online Open Courses (MOOCs) with a heritage focus be used effectively within compulsory secondary education in connection with Content and Language Integrated Learning (CLIL) and work experience methodologies?; 2) Can such heritage MOOCs increase access to education content amongst secondary school students? 3) How can heritage MOOCs create educational links between higher education*

and schools, to promote cultural heritage literacy in geographically dispersed communities? 4) How can heritage MOOCs engage 'local' communities, in particular via secondary schools?

The first research question has been tackled by developing a new way to think about MOOC materials. The interactions occurring on FutureLearn from the Italian community have shown the importance of the translations and subtitles within the platform to support learners where English is not their first language. The first case study, focusing on the CLIL methodology, has seen some videos being selectively used in a flipped-classroom approach. The class was encouraged to watch the videos at home and use the time in the class to discuss some of the more comprehensive thematic pathways (buildings, phases, excavations/discoveries, computer graphics and the Roman trade network). The engagement with the students occurred in a closed Facebook group that, in some respects, replicated the comments in FutureLearn. Students particularly liked that the videos were found to be clear and interesting, despite students being critical about the Synote platform:

"*In my opinion, this project was really interesting and useful in order to learn new things in a different way. I think that this activities should be encouraged even more because they're much more involving than studying the same things at school with books.*"

The second case study repurposed the same material and thematic pathways focusing on the translation of associated text and the production of similar content by students for their own city. Students were supported by experts based at their school while learning the software and with the production of translations were invited to watch the videos derived from the MOOC at home like in the first case study. In addition, they decided which content to produce in order to support tourism in their city as part of their service-learning activity. Even though the numbers of participants were low, in both cases, the scholarship activities produced encouraging results evidencing that content created for heritage MOOCs can be successfully re-purposed for blended learning. Students and teachers have recognised improvements in students' knowledge and skills development as a result of the pilots. The key is in the way they are being "repackaged" and presented to the class.

The second research question concerned the increase in access to educational content, which has been tackled by looking at and analysing the engagement on the *Archaeology of Portus* MOOC and the data from the two case studies. Despite the limited engagement from the Italian online community (see Chapter 4), some underlying similarities with the students were found. Both cohorts had limited knowledge of Portus, its history and the

technology used by the archaeology sector at the beginning of the MOOC or the pilot. While the online course was designed to increase each learner's knowledge of Roman archaeology and the site, the initial pilot has seen the same learning objectives used to complement Latin literature and Roman history within the school curriculum. In this case, CLIL methodology was applied, and the results, informally validated by the teacher, showed that whilst students have increased their knowledge of the Roman world, it had a limited impact on their learning of English. Results from the second pilot have shown how much the activities have contributed to the development of their language, and in one case 3D modelling skills while learning about Roman archaeology. The inclusion of 3D modelling and digital content into the two pilots have proven to be adaptable to a variety of pedagogical contexts, encouraging the exploration of new approaches and deepening critical engagement with the past as discussed by Nicholls (2019) and Dell'Unto (2016; et al., 2017). In addition, other resources such as Flickr, the *Archaeology of Portus* MOOC blog and the Portal have provided the students to additional content and perspectives they would not have gained otherwise.

Feedback from the two pilots suggested that the third question, which is to explore how heritage MOOCs can link higher education and school to promote cultural heritage literacy, was best addressed in two steps. Firstly, the online course acted as a catalyst, attracting teachers from around the world, as demonstrated by the enrolment record. In addition, initial contact with the Italian teacher was facilitated by the platform, and this is described at the beginning of this thesis. Furthermore, comments from the Archaeology of Portus MOOC blog post on pottery highlight that there is a clear interest in the content by those in the educational sector:

"Fine way of explaining, and good post to take facts regarding my presentation subject, which i am going to deliver in university."

Secondly, the two pilots have shown how secondary schools could use the material created and decide the level of direct engagement with higher education institutions. It also needs to be noted that over thirty Italian teachers replied to the call for interest circulated before the second pilot. Unfortunately, most of the teachers were interested in collaborations on topics outside the scope of this research (e.g. Shakespeare, bronze age in Britain, modern art) underlining the potential for the application of this methodology on a broader scale. Whilst there is a lot of content online that is inaccurate, misleading, or in some cases, very dangerous, there is also a great deal of good, useful and inspiring content. This work has demonstrated how teachers can ensure students are discovering the delivery that best helps them to learn (first case study) and can present their ideas no

matter what tools and technologies were selected (second case study). Students are then becoming cultural heritage prosumers (Bertacchini and Tavernise, 2014; Bertacchini et al., 2008), freeing themselves from a more traditional and passive role of assimilating concepts to a more active role in the process that involved the phases of creation (e.g. thinking about new tourist information – pilot 2), production (e.g. creating 3D models – pilots 1 and 2), distribution (e.g. sharing information on a Facebook group – pilot 1 or sharing translations on the Portus Portal – pilot 2) and consumption of heritage content (pilots 1 and 2).

Finally, the fourth research question, regarding the role played by secondary schools in engaging 'local' communities, was addressed by the second case study. The need to enhance at least a part of the country's rich artistic and cultural heritage led the students of the secondary school in Milan to translate into Italian part of the content from the MOOC in an attempt to engage with the local community. In addition, the pupils planned and created additional material in English about Milan to attract and promote tourism to historical places not regularly visited. The work placement pilot, with the addition of the service-learning component, has the potential to concretely implement multidisciplinary and interdisciplinary educational models, as demonstrated by the four students that have stated a new connection with the community was found as a result of this project. The tension towards the perspective of a unified knowledge is widespread, both in the most accredited pedagogical orientations and in the teachers' aspirations. However, it is not easy to overcome the fragmentation of the disciplines and the continually changing legislation. However, when attention focuses on demanding problems, the solution of which cannot be entrusted within the knowledge of a single discipline, the use of multiple contributions is indispensable. A positive side-effect of the integration of disciplines is the collaborations between teachers (MIUR, 2018). There are numerous experiences documenting collegiate work, a co-teaching practice that arises from the needs of the activity itself (MIUR, 2018). This is true also in this pilot, where the links with Prof. Genta and Fugaro are still active, and there is a plan to continue the collaboration further. On the didactic level, Service-Learning is characterised by being a methodology that does not require any particular financial, technological or material resources. It instead creates benefits and outcomes to serve a community. This approach, in combination with the work placement, has created a more efficient way to meet the learning objectives for each student in the class.

The sustainability of digital resources created remains one of the major problems encountered in the research process and by educators who want to reuse them (Atkins et al., 2020). As discussed throughout the thesis, the creation of content on educational

platforms such as FutureLearn, Coursera and edX is facilitated by the presence of a structured approach and extensive guidance on how to create engaging, open and user-friendly learning objects. At the same time, it limits the opportunity for long term digital sustainability and reusability of the content, which remains the responsibility of the creators of the resources and it is not always planned upfront. The example provided by *Archaeology's Dirty Little Secrets* has demonstrated the concrete risk connected to hosting all resources on a specific platform, while *Archaeology of Portus* and *Hadrian's Wall* presented similar issues connected with external applications and tours created to support learners. In contrast, #dariahTeach has presented how effective and sustainable open educational resources can be when planned due to effective user-centred design and testing, showing how good practices can be embedded into established processes.

With their expertise in digital preservation, Libraries are essential partners (Pomerantz, 2018) in the development of accessible and sustainable learning objects. The development of periodically reviewed institution-wide policies for digital preservation and improved metadata can mitigate some of the barriers discussed; long term sustainability of resources should be the responsibility of every one part of the community of researchers and practitioners in this field.

This chapter began with a simple quote from Maria Montessori (1949, p 283) and a comment from a learner representing both the teachers' and students' views on education and the MOOC. Embracing Montessori's theory, my purpose has been to enable teachers to use the online digital material independently without the need of an archaeologist or heritage professional once the primary resources are created for a MOOC. Through this work, the teachers have become more independent, and my direct engagement with the students has diminished and was replaced by "in house" expertise. The learners' comments fully represent a digital journey through the information proposed as the "Grand Tour" mentioned at the beginning of this work. In the same way, I have taken the same journey applying the Action Research methodology that challenged me to rethink traditional ideas about communicating and engaging with archaeological and heritage content using an online medium. The project has grown and adapted over the years, building on the initial content developed over six years ago. Traditionally the communication about heritage in an online education setting is led by the archaeologist, or heritage specialist, or educators. At the same time, in the pilots proposed through this research, teachers are free to reuse the content to fit the local environment better. Students are then free to develop their own narrative and experience using cultural heritage content as a starting point. Clearly, the results suggest that the combination of accessible open cultural heritage resources and educational methodologies creates

endless cross-country literacy opportunities, the need for which will only increase with time.

Appendix A List of courses and resources created on Archaeology and Cultural Heritage from 2013 until December 2020

Colorado State University Online (2019) *The Fall of the Roman Republic - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/fall-of-the-roman-republic (Accessed 5 June 2021).

Durham University (2019) *Forensic Archaeology and Anthropology - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/forensic-archaeology-and-anthropology (Accessed 5 June 2021).

Durham University (2019) *Forensic Archaeology and Anthropology - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/forensic-archaeology-and-anthropology (Accessed 5 June 2021).

Durham University (2019) *Archaeology and the Battle of Dunbar 1650: From the Scottish Battlefield to the New World - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/battle-of-dunbar-1650 (Accessed 5 June 2021).

Durham University (2021) *The Battle of Dunbar 1650 - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/battle-of-dunbar-1650 (Accessed 4 June 2021).

École Pratique des Hautes Études (2019) *La sculpture grecque d'Alexandre à Cléopâtre (Partie II) - FunMOOC* [online]. Available from: https://www.fun-mooc.fr/fr/cours/la-sculpture-grecque-dalexandre-a-cleopatre-partie-ii/ (Accessed 5 June 2021).

École Pratique des Hautes Études (2019) *La sculpture grecque d'Alexandre à Cléopâtre (Partie I) - FunMOOC* [online]. Available from: https://www.fun-mooc.fr/fr/cours/la-sculpture-grecque-dalexandre-a-cleopatre-partie-i/ (Accessed 5 June 2021).

European University Institute (2017) *Cultural Heritage and the City - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/cultural-heritage-cities (Accessed 5 June 2021).

Europeana (2020) *Europeana in your classroom: building 21st-century competences with digital cultural heritage- European Schoolnet Academy* [online]. Available from: https://www.europeanschoolnetacademy.eu/courses/course-v1:Europeana+Culture_EN+2020/about (Accessed 5 June 2021).

Griffith University (2017) *Cities of Yesterday, Today and Tomorrow: Why Heritage Matters - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/heritage-matters (Accessed 5 June 2021).

Harvard University (2013) *Pyramids of Giza: Ancient Egyptian Art and Archaeology | edX* [online]. Available from: https://www.edx.org/course/pyramids-of-giza-ancient-egyptian-art-and-archaeol (Accessed 5 June 2021).

Harvard University (2015a) *The Book: Books in the Medieval Liturgy - edX* [online]. Available from: https://www.edx.org/course/the-book-books-in-the-medieval-liturgy (Accessed 5 June 2021).

Harvard University (2015b) *The Book: Making and Meaning in the Medieval Manuscript - edX* [online]. Available from: https://www.edx.org/course/the-book-making-and-meaning-in-the-medieval-manusc (Accessed 5 June 2021).

Harvard University (2016a) *The Book: Monasteries, Schools, and Notaries, Part 1: Reading the Late Medieval Marseille Archive - edX* [online]. Available from: https://www.edx.org/course/the-book-monasteries-schools-and-notaries-part-1-r (Accessed 5 June 2021).

Harvard University (2016b) *The Book: Monasteries, Schools, and Notaries, Part 2: Introduction to the Transitional Gothic Script | edX* [online]. Available from: https://www.edx.org/course/the-book-monasteries-schools-and-notaries-part-2-i (Accessed 5 June 2021).

Harvard University (2016c) *The Ancient Greek Hero - edX* [online]. Available from: https://www.edx.org/course/the-ancient-greek-hero-2 (Accessed 5 June 2021).

Harvard University (2017) *The Book: Scrolls in the Age of the Book - edX* [online]. Available from: https://www.edx.org/course/the-book-scrolls-in-the-age-of-the-book (Accessed 5 June 2021).

Historic England (2020a) *Soil texturing* [online]. Available from: https://rise.articulate.com/share/u7eJHi8WLhfLuaH2RdqZ_NzjpVkSTwmI#/ (Accessed 5 June 2021).

Historic England (2020b) *Heritage values* [online]. Available from: https://rise.articulate.com/share/2f27Wmmi1PXISC6QR4S7gDTmLY7xnD3A#/ (Accessed 5 June 2021).

Historic England (2020c) *Using aerial photography for archaeological heritage management* [online]. Available from: https://rise.articulate.com/share/HmSqz0fHn0V4OaQ_6mQ3Ga5LBkby35bP#/ (Accessed 5 June 2021).

Historic England (2020d) *Vacant listed buildings* [online]. Available from: https://rise.articulate.com/share/UIpA_Xvp0GVWgoQvsvAPEYzlnO1koc5i#/ (Accessed 5 June 2021).

Historic England (2020e) *Heritage crime - a training resource for police officers* [online]. Available from: https://rise.articulate.com/share/BfcefAlV7rroYK4-gALi74hhA_U1bbvi#/ (Accessed 4 June 2021).

Historic England (2020f) *Unlocking Historic Buildings* [online]. Available from: https://rise.articulate.com/share/kaXr2MBzL7q5Hej_UFj178hsesaoPAbF#/ (Accessed 4 June 2021).

Historic England (2020g) *Managing Animal Burrowing at Historic Sites: A Case Study* [online]. Available from: https://rise.articulate.com/share/JljL9YYMUbdH1Aw4Sd1C7aY407xAh72D#/ (Accessed 4 June 2021).

Historic England (2020h) *The Adaptive Reuse of Traditional Farm Buildings* [online]. Available from:

https://rise.articulate.com/share/7jB5V_3sRXNBjZeT4R6GAgrIC6Op8A-v#/ (Accessed 4 June 2021).

Historic England (2020i) *Farm Buildings: Policy and Practice* [online]. Available from: https://rise.articulate.com/share/HU9hqDaBvXm3xz8qw-XM9maDWkRletfD#/ (Accessed 4 June 2021).

Historic England (2020l) *Understanding and Managing World Heritage Sites* [online]. Available from: https://rise.articulate.com/share/X4PVb7dZxauJf7NrL7s6X2_CHEWbC-NQ#/ (Accessed 4 June 2021).

Lancaster University (2020) *Lancaster Castle and Northern English History - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/lancaster-castle (Accessed 5 June 2021).

Library of Alexandria (2017) *Ancient Egyptian Civilization - edX* [online]. Available from: https://www.edx.org/course/ancient-egyptian-civilization (Accessed 5 June 2021).

Newcastle University (2013) *Hadrian's Wall: Life on the Roman Frontier - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/hadrians-wall (Accessed 4 June 2021).

Norwegian University of Science and Technology (2021) *Preserving Norwegian Stave Churches - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/norwegian-stave-churches (Accessed 4 June 2021).

Papadopoulos, C. (2020) *Course: Remaking Material Culture in 3D* – DariahTeach [online]. Available from: https://teach.dariah.eu/course/view.php?id=55 (Accessed 4 June 2021).

Politecnico di Milano (2017) *Archaeoastronomy - Coursera* [online]. Available from: https://www.coursera.org/learn/archaeoastronomy#reviews (Accessed 5 June 2021).

Princeton University (2015) *Global History Lab - edX* [online]. Available from: https://www.edx.org/course/global-history-lab (Accessed 5 June 2021).

Sapienza University of Rome (2017a) *Recovering the Humankind's Past and Saving the Universal Heritage - Coursera* [online]. Available from: https://www.coursera.org/learn/preserving-cultural-heritage (Accessed 5 June 2021).

Sapienza University of Rome (2017b) *At the Origins of the Mediterranean Civilization: Archaeology of the City from the Levant to the West - 3rd-1st millennium BC - Coursera* [online]. Available from: https://www.coursera.org/learn/archaeology-city-levant-west (Accessed 5 June 2021).

Sapienza University of Rome (2018) *The Changing Landscape of Ancient Rome. Archaeology and History of the Palatine Hill - Coursera* [online]. Available from: https://www.coursera.org/learn/palatine-hill-archaeology-history (Accessed 5 June 2021).

Sapienza University of Rome (2020a) *L'Egitto prima e dopo i faraoni. Dalla nascita dello Stato (3000 a.C. ca.) alle prime comunità cristiane (IV secolo d.C.) | Coursera*

[online]. Available from: https://www.coursera.org/learn/egitto (Accessed 5 June 2021).

Sapienza University of Rome (2020b) *Paesaggi di Roma Antica. Archeologia e storia del Palatino. - Coursera* [online]. Available from: https://www.coursera.org/learn/paesaggi-roma-antica (Accessed 5 June 2021).

Sapienza University of Rome (2020c) *Alle origini della civiltà mediterranea: archeologia della città dal Levante all'Occidente - III-I millennio a.C. - Coursera* [online]. Available from: https://www.coursera.org/learn/nigro-levante-occidente#instructors (Accessed 5 June 2021).

Tel Aviv University (2020) *The Fall and Rise of Jerusalem - Coursera* [online]. Available from: https://www.coursera.org/learn/jerusalem (Accessed 5 June 2021).

The Open University (2017) *Health & Wellbeing in Ancient World - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/ancient-health (Accessed 5 June 2021).

The Smithsonian Institution (2015) *Teaching Historical Inquiry with Objects - edX* [online]. Available from: https://www.edx.org/course/teaching-historical-inquiry-with-objects (Accessed 5 June 2021).

The Smithsonian Institution (2020) *Interdisciplinary Teaching with Museum Objects - edX* [online]. Available from: https://www.edx.org/course/interdisciplinary-teaching-with-museum-objects (Accessed 5 June 2021).

The University of Colorado (2017) *Deciphering Secrets: The Illuminated Manuscripts of Medieval Europe - Coursera* [online]. Available from: https://www.coursera.org/learn/medieval-europe (Accessed 5 June 2021).

The University of Dundee (2016) *Identifying the Dead: Forensic Science and Human Identification - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/identifying-the-dead (Accessed 5 June 2021).

The University of Glasgow (2019) *Antiquities Trafficking and Art Crime Free Online Course - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/art-crime (Accessed 5 June 2021).

The University of Glasgow (2017) *Early Modern Scottish Palaeography: Reading Scotland's Records - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/ems-palaeography (Accessed 5 June 2021).

The University of Newcastle Australia (2019) *Anthropology: Understanding Societies and Cultures - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/cultures-societies-introducing-anthropology (Accessed 5 June 2021).

Trinity College Dublin (2018) *The Book of Kells: Exploring an Irish Medieval Masterpiece - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/book-of-kells (Accessed 5 June 2021).

Tsinghua University (2015) *Historical Relic Treasures and Cultural China - edX* [online]. Available from: https://www.classcentral.com/course/edx-historical-relic-treasures-and-cultural-china-3062 (link not available anymore) (Accessed 5 June 2021).

Universidad Carlos III de Madrid (2016) *Deciphering Secrets: Unlocking the Manuscripts of Medieval Burgos (Spain) - edX* [online]. Available from: https://www.edx.org/course/deciphering-secrets-unlocking-the-manuscripts-of-3 (Accessed 5 June 2021).

Universidad Carlos III de Madrid (2017) *Deciphering Secrets: Unlocking the Manuscripts of Medieval Toledo (Spain) - edX* [online]. Available from: https://www.edx.org/course/deciphering-secrets-unlocking-the-manuscripts-of-m (Accessed 5 June 2021).

Universidad Complutense de Madrid (2019) *Escritura y documentos en la Iberoamérica colonial - Miríadax* [online]. Available from: https://miriadax.net/web/escritura-y-documentos-en-la-iberoamerica-colonial-2-edicion-/inicio (Accessed 5 June 2021).

Università Bocconi (2020) *Arts and Heritage Management - Coursera* [online]. Available from: https://www.coursera.org/learn/arts-heritage (Accessed 5 June 2021).

Université Paris Lumières (2020) *Faire parler les pierres taillées de la préhistoire - FunMOOC* [online]. Available from: https://www.classcentral.com/course/france-universite-numerique-faire-parler-les-pierres-taillees-de-la-prehistoire-12615 (Accessed 5 June 2021).

Universiteit Leiden (2016) *Osteoarchaeology: The Truth in Our Bones - Coursera* [online]. Available from: https://www.coursera.org/learn/truthinourbones-osteoarchaeology-archaeology (Accessed 5 June 2021).

Universiteit Leiden (2017) *Heritage under Threat - Coursera* [online]. Available from: https://www.coursera.org/learn/heritage-protection (Accessed 5 June 2021).

University of Arizona (2016) *Roman Art and Archaeology - Coursera* [online]. Available from: https://www.coursera.org/learn/roman-art-archaeology (Accessed 5 June 2021).

University of Barcelona (2015) *Magic in the Middle Ages - Coursera* [online]. Available from: https://www.coursera.org/learn/magic-middle-ages (Accessed 5 June 2021).

University of Buckingham (2015) *Stonehenge - Iversity* [online]. Available from: https://iversity.org/en/courses/stonehenge-january-2016 (Accessed 5 June 2021).

University of Geneva (2020) *A l'avènement du christianisme : l'archéologie des derniers païens - Coursera* [online]. Available from: https://www.coursera.org/learn/archeology (Accessed 5 June 2021).

University of Leicester (2015) *England in the Time of King Richard III - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/england-of-richard-third (Accessed 5 June 2021).

University of Liverpool (2017) *Superpowers of the Ancient World: the Near East - FutereLearn* [online]. Available from: https://www.futurelearn.com/courses/superpowers-near-east (Accessed 5 June 2021).

University of Newcastle, A. (2017) *A History of Violence: From the Middle Ages to Modern Times - edX* [online]. Available from: https://www.edx.org/course/a-history-of-violence-from-the-middle-ages-to-mode (Accessed 5 June 2021).

University of Pennsylvania (2018a) *Wonders of Ancient Egypt - Coursera* [online]. Available from: https://www.coursera.org/learn/wonders-ancient-egypt (Accessed 5 June 2021).

University of Pennsylvania (2018b) *Introduction to Ancient Egypt and Its Civilization - Coursera* [online]. Available from: https://www.coursera.org/learn/introancientegypt (Accessed 5 June 2021).

University of Reading (2016) *Rome: A virtual tour of the Ancient city - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/rome (Accessed 5 June 2021).

University of Reading (2021) *Archaeology: from dig to lab and bayond - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/archaeology (Accessed 4 June 2021).

University of Southampton (2013) *Archaeology of Portus: Exploring the Lost Harbour of Ancient Rome - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/portus (Accessed 4 June 2021).

University of Southampton (2014) *Shipwrecks and Submerged Worlds: Maritime Archaeology - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/shipwrecks (Accessed 5 June 2021).

University of Southampton (2015) *Agincourt 1415: Myth and Reality - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/agincourt (Accessed 5 June 2021).

University of Wollongong (2016) *Homo Floresiensis Uncovered - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/homo-floresiensis (Accessed 5 June 2021).

University of York (2021) *Exploring Stone Age Archaeology: The Mysteries of Star Carr - FutureLearn* [online]. Available from: https://www.futurelearn.com/courses/exploring-stone-age-archaeology-the-mysteries-of-star-carr (Accessed 5 June 2021).

Wesleyan University (2015) *The Ancient Greeks - Coursera* [online]. Available from: https://www.coursera.org/learn/ancient-greeks (Accessed 5 June 2021).

Yale University (2007) *Introduction to Ancient Greek History | Open Yale Courses* [online]. Available from: https://oyc.yale.edu/classics/clcv-205 (Accessed 6 June 2021).

Yale University (2009) *Roman Architecture | Open Yale Courses* [online]. Available from: https://oyc.yale.edu/history-of-art/hsar-252 (Accessed 6 June 2021).

Yale University (2011) *The Early Middle Ages, 284–1000 | Open Yale Courses* [online]. Available from: https://oyc.yale.edu/history/hist-210 (Accessed 6 June 2021).

Yale University (2017) *Roman Architecture Course - Coursera* [online]. Available from: https://www.coursera.org/learn/roman-architecture (Accessed 5 June 2021).

Yeshiva University (2016) *Arch of Titus: Rome and the Menorah | Coursera* [online]. Available from: https://www.coursera.org/learn/archoftitus (Accessed 5 June 2021).

Appendix B Survey created to collect students information at the beginning and at the end of the pilots

Questionnaire 1 – To be used at the beginning of the pilots

1. Is your family from Turin/Milan? Yes/No
   a. If not, where is your family originally from?
2. Have you participated an online course (MOOCs) or a language online course in the past 2 years? Yes/No
   a. If Yes, which one?
3. Do you use social media? Yes/No
   a. If yes, how often? More than once a day/Once a day/Once a week or more/Less than once month
4. Which of the following Social media tools do you normally use? Facebook/Twitter/Instagram,/WhatsUp/Other
   a. If other, which one?
5. From 1 to 10 how much do you think is your knowledge of Rome and Roman world?
6. From 1 to 10 how confident you feel in using English in the classroom?
7. Have you ever been in Rome? Yes/No
   a. If yes, what have you visited?
8. Have you ever visited Ostia? Yes/No
   a. If yes, what thing/s have you found most interesting?
9. Have you ever visited Portus? Yes/No
   a. If yes, what thing/s have you found most interesting?
   b. If no, Have you ever heard anything about
   Portus (Porto esagonale di Traiano)?
10. Which do you think has been founded before? Ostia/Portus
11. In which Harbour in the area of Rome used to arrive, from the Claudian era onwards, the boats with food and materials to then be re-distributed across the Empire? Ostia/Portus
12. Do you think your city has a connection with Rome? Yes/No
   a. If yes, which type?
13. Do you feel you have a connection with the town you are living in? Yes/No
   a. If not, why do you think is the reason?
14. Do you know any community groups organising historical reconstruction in your area? Yes/No

a. If yes, which one?

15. Have you ever been involved in a local historical reconstruction? Yes/No

a. If yes, which one?

16. Have you ever visited a museum in your town about local history? Yes/No

a. If yes, which one?

17. Do you know any archaeological/historical site in the city you are currently living in? Yes/No

a. If yes, which one?

18. Have you ever used any software or app to reconstruct objects or buildings in 3d?

a. If yes, which have you used?

19. How do you normally learn about history/archaeology? I don't/websites/on school books/by talking to friends/by visiting the site/watching documentaries/Other

a. If other, Please specify 'Other'

20. Have you ever watched documentary about roman History and/or archaeology? Yes/No

a. If yes, which one (eg. Passaggio a Nord Ovest)? What is the thing you like the most?

Questionnaire 2 - To be used at the end of the pilots

1. What is your name?
2. Have you used social media more often as consequence of this course?
3. Which of the following Social media tools are you using more?
Facebook/Twitter/Instagram/WhatsUp
4. From 1 to 10 how much do you think is your knowledge of Rome and Roman world after have completed the course
5. From 1 to 10 how confident you feel in using English in the classroom?
6. Which do you think has been founded before? Ostia/Portus
7. In which Harbour in the area of Rome used to arrive, from the Claudian era onwards, the boats with food and materials to then be re-distributed across the Empire? Ostia/Portus
8. Would you like to visit Portus? Yes/No
9. As result of this course, do you think you have learned more about the history and archeology of Turin? Yes/No
    a. If yes, what have you learned?
10. As result of this course, do you think you have learned more about the history and archeology of Portus? Yes/No
    a. If yes, what have you learned?
    b. If no, what do you think should be included in the course?
11. Do you think your city has a connection with Rome? Yes/No
    a. If yes, which type?
12. Do you feel you have a connection with the town you are living in? Yes/No
    a. If not, why do you think is the reason?
13. Do you feel you know more about the community currently based in Fiumicino? Yes/No
    a. If yes, do you think this course helped you?
14. Do you feel your connection with the town you are living in has improved? Yes/No
    a. If yes, please explain why
15. Which things/skills have you improved/learned as result of this course?
16. Do you feel more confident in writing and interacting in English?
17. Which of the activity you have found more useful while learning a about Portus and Roman History?

Appendix C Example of simplified English text and translation in Italian to improve readability

Step	Original text in English	Rewritten text in English
3.9 video	ANITA THOMPSON: So, the ERT survey behind us is on quite a small scale. How would you go about surveying a larger landscape? KRISTIAN STRUTT: Well, the ERT equipment that's set up here behind us, the probes have been set up at one metre intervals. Now, the way in which resistance survey works is that you're generally dealing with the depth about half the distance between the probes in terms of the depth of the propagation of the current and your measurement. And, on a small scale like this, we can set the probes up at metre spacings and get quite a high resolution survey, going down in half metre increments of depth, and every metre along the profile. So, for an archaeological site like this, where we're working on structures, warehouses, and things associated with the port, that's the kind of resolution we want. We want to see walls. We want to see variations in the stratigraphy, and so on and so forth. When it comes to surveying broad landscapes, you are more looking at the things to do with the geomorphology and the geoarchaeological landscape. Now, what we can do with this multiprobe array is, we can increase the spacing between the probes, up to five metres spacing. Now, patently when we set it up at five metre spacing, you'll have a longer profile. You'll cover a longer profile every time you do the survey. Your spacing at five metres means you're getting down in 2 and 1/2 metre increments. So, you're going down much deeper, much faster. But you're also losing resolution. You're getting a reading every 2 and 1/2 metres rather than every half a metre. And this system is ideal, then, for looking at things like channels, canals, paleochannels, and much larger features. You wouldn't pick up, using that resolution, things like walls, buildings. But you would pick up the broader variations and geomorphological changes in the landscape. FRANZISKA MARCHESELLI: Can you put all the results of the different kinds of geophysics together to create a bigger image? KRISTIAN: You can. One of the things that we're trying to do with the project of Portus is to ensure good integration of material from different methods, both geophysics and things like remote sensing. In terms of the geophysics, we've covered the landscape of Portus extensively with magnetometry, something to the tune of 250 hectares of survey around the port itself, and another 170 hectares south of the *Fossa Traiana* going down towards Ostia Antica. That's a massive area to survey. We can do it with magnetometry. It's another thing to try and do that with things like electrical resistivity tomography and ground penetrating radar, which runs at a slightly slower pace, especially when we're dealing with single antenna or single sets of multiprobes. So, in that instance, what we've chosen to do is target different areas across that landscape, using these other techniques. So, a lot of the work we've done close to the port here, using ERT and GPR, has allowed us to get really detailed coverage, where we did the magnetometry originally, and to find out what's going on in terms of three dimensions in terms of the increasing depths of the site. ANITA: That sounds like a very complicated process. Lizzie, could you give us a more basic	ANITA THOMPSON: The Electrical Resistivity T[...] small scale. How would you surveying a larger la[...] KRISTIAN STRUTT: The ERT equipment (called[...] up at one metre intervals. The resistance survey[...] the distance between the probes in terms of the[...] your measurement. On a small scale like this, we[...] have a high resolution survey. We go down in ha[...] along the profile. This is the resolution we want f[...] we're working on structures, warehouses, and th[...] walls. We want to see variations in the stratigrap[...] When we are surveying larger landscapes, you a[...] geomorphology and the geoarchaeological lands[...] increase the spacing between the probes, up to[...] metre spacing, you'll have a longer profile. You'll[...] survey. Your spacing at 5 metres means you're g[...] So, you're going down much deeper, much faste[...] getting a reading every 2 and 1/2 metres rather t[...] ideal, for looking at things like channels, canals,[...] You wouldn't pick up, using that resolution, thing[...] the broader variations and geomorphological cha[...] FRANZISKA MARCHESELLI: Can you put all th[...] together to create a bigger image? KRISTIAN: You can. One of the things that we're[...] ensure good integration of material from differen[...] remote sensing. In terms of the geophysics, we'v[...] extensively with magnetometry around 250 hect[...] another 170 hectares south of the *Fossa Traiana*[...] big area to survey. We can do it with magnetome[...] with things like electrical resistivity tomography a[...] slightly slowely, especially when we're dealing w[...] multiprobes. This time we've chosen to target dif[...] these other techniques. We have done a lot of w[...] GPR. This has allowed us to get detailed data in[...] magnetometry originally. It also allowed us to fin[...] dimensions. ANITA: That sounds like a very complicated pro[...]

LIZZIE RICHLEY: Integration is important because each geophysical technique can reveal different aspects of the subsurface. Each technique measures a different quality. And, therefore, we can pick up different features and different amounts of detail from each technique. If we did one technique, we might miss obvious readings which we can pick up in another technique. For instance, Kris mentioned magnetometry. It can pick up highly volcanic rocks. If you're doing the survey in a highly volcanic area, you're not going to pick up any archaeology, at which point we need to do other techniques in that area. These will be on top of magnetometry if we have done it there, to then pick out the features which we wouldn't see with this technique. And so, when we can merge them all together, in both the graphical formats and also numerically, we can pick out stronger features which they all have either picked up or which only one has picked up. You can make a judgement as to whether they are more likely to be archaeology or more likely to be geological or natural occurrences within the data sets.

FRANZISKA: Finally, are there any other methods of studying a landscape, other than geophysics?

KRISTIAN: Here, we use a lot of geophysics to study the area, from Portus all the way down to Ostia Antica. There are a number of other different things that we're using in order to look at the area. We are, to a certain degree, restricted in terms of what areas we can access. They're also pretty much like using varying techniques in geophysics, other methods that show different features in the landscape. So, in addition to geophysics, we've been looking at remote sensing imagery, satellite imagery, both panchromatic, colour image and multispectral, a band satellite imagery. Now, what you can do with that is, you can set the different bands so you can see basically using different parts of the spectrum of light and see what features show up in terms of archaeology in the landscape. It allows you to highlight various features that may run across that landscape.

In addition to that, we've been looking at things like the air photographic imagery that the RAF took in 1943 and 1944 as part of the pre-invasion and invasion of Italy during the Second World War. Our imagery is especially useful, because a lot of the area around Portus has been developed in the last 15 to 20 years. Modern satellite imagery, there's a lot of conurbation, industrial space, et cetera, that now cover a lot of the interesting archaeology. We can take these aerial photographs from 70 years back and see areas that 70 years ago were all just fields, and see features in those fields and be able to, again, interpret what archaeology is there that we cannot now survey because it's part of our past.

In addition, we've been using kind of platforms such as drones or balloons to take near infrared aerial photography as part of the seasons, with Belgian colleagues working on different parts of the port. And again, that will help under different conditions during different parts of the year to highlight archaeological features in the port and in the immediate area. And then we can integrate all of this so we can see things in terms of spatially put together and produce interpretations and see exactly what's going on in terms of archaeological features across the broader landscape.

ANITA: Lizzie, Kris, thank you very much. We look forward to seeing the results.

SMOG SCORE: 24

SMOG SCORE: 16.9

Step	Original text in English	Translated text in Italian
4.1	What are we doing in week 4?	Cosa faremo nella quarta settimana?
video	DR. DRAGANA MLADENOVIĆ: Hello, welcome to week four. You're nearly there. So what have we learned so far? Well, it seems quite a lot. By now, we know the role of Portus within the Roman Mediterranean. We also understand how it functioned within the system of ports of imperial Rome. We looked at how the site was established. We looked at how it got transformed throughout the second century. We looked at some of the major buildings. Also, we looked at how we studied the site as a whole – first, by non-destructive means, and how we also studied the landscape of the site. So exciting news – this week, we get to excavate. And excavation is the most exciting part of archaeologists' work. But it's also – well, it's dangerous, actually, because it's destructive. You only get one go at it. And if you've done it poorly, you have destroyed information that has been preserved in the ground for thousands of years. So it has to be done meticulously. It has to be recorded really, really well. And this is what we'll tell you a bit more about this week. Also, we'll look at some other buildings. We will look at the mysterious Building Five. We'll look at some of the digital technologies that we do to reconstruct and to simulate the environment of the ports to see how this site actually worked, and to analyse some of the buildings and see how we can reconstruct them best. And also, we'll move on (along) the chronological scale, and we'll look at what happened in the third and the fourth century. So let's see what happens next.	DR. DRAGANA MLADENOVIĆ: Ciao, benvenu[...] Quindi, che cosa abbiamo imparato fino ad ora[...] il ruolo di Portus nel Mediterraneo romano. Sap[...] sistema di porti di Roma imperiale. Abbiamo os[...] anche visto come è stato trasformato nel corso[...] degli edifici principali. Inoltre, abbiamo osserva[...] primo luogo, con metodologie non distruttive, e[...] Una buona notizia - questa settimana, si inizia [...] del lavoro degli archeologi. Ma è anche - beh, i[...] solo un'opportunità. E se scavi male, hai distru[...] terreno per migliaia di anni. Quindi deve essere[...] registrato davvero, davvero bene. E questo è c[...] settimana. Inoltre, esploreremo altri edifici. Gua[...] ad alcune delle tecnologie digitali che usiamo p[...] ci permettono di visualizzare come questo luog[...] e vedere come li possiamo ricostruire. Inoltre, c[...] vedremo quello che è successo nel terzo e nel [...]
	SMOG SCORE: 16.9	**GULPIESE SCORE: 62**

Step	Original text	Translated Text
1.16 OBJ	The value of ceramics In this whistle-stop tour we have explored the Claudian harbour, and its place in the Roman world. We have thought about connections to other parts of the Empire and examined our first major public building. In the last section of week one we will take a look at the finds that make these connections visible. Anyone who has visited a Classical archaeological site in the Mediterranean will be aware of the many thousands of sherds of pottery and pieces of brick and marble that litter the surface; this is because pottery is pretty well indestructible. In the old days, since archaeologists tended to choose the most complete or unusual fragments for their museums or publication, the majority of ceramics finds on archaeological sites were re-buried or simply stored away in museum basements without ever being studied. Today, however, since we know that the careful and systematic study of this abundant material can tell us about ancient commerce and domestic activity, many archaeologists attempt to record most, if not all, pottery from archaeological sites. This often presents a huge logistical challenge because of the sheer amount of material to be studied and the slow and painstaking methods required to extract the maximum amount of information from it. This has been very true at Portus. Since the site was the maritime port of Imperial Rome, and the principal conduit through which flowed many of the supplies needed at the Capital, we have found ceramics from all corners of the Mediterranean basin. Our specialists have separated the material from each context at the site into amphorae (containers for the long-distance transport of foodstuffs), fine table wares, coarse table wares and kitchen wares. They have then studied a combination of their shapes (for example their rim, handle or base), forms (according to catalogues of characteristic known shapes) and fabrics (the character of the clays from which they were made and the mineral fillers within it) in an attempt to try and identify their dates of production and origins. In this way we have been able to establish a factual basis for looking at commercial connections between Portus and the Mediterranean through the different periods of activity that we have documented at the site. We have been able to identify peaks of intense commercial exchange between the port and other Mediterranean ports that we then try to explain in light of other archaeological and historical evidence. The discovery that amphorae from the Roman province of Tripolitania (modern Libya) that were very common at Portus in the earlier were replaced by those from the province of Africa (modern Tunisia) and the East Mediterranean during the 4th and 5th centuries AD is one example of this. Simon has picked out some terms from the video that you might want to research further: • Shape of a pottery fragment e.g. a rim, handle or base • Form of a sherd of pottery e.g. a specific type of amphora, such as the Pélichet 47 (named after the archaeologist who first characterized the form), fineware, such as the African Red Slip Ware Hayes 50 (named after the archaeologist who undertook the first comprehensive classification of this material), or coarseware • Fabric of a pottery sherd e.g. the type of clay, and minerals included within it	Il valore de In questa visita veloce abbiamo esplorato il Po Abbiamo pensato alle relazioni con le altre part costruzione pubblica. Nell'ultima sezione della scoperta che ha reso queste connessioni possi Chiunque abbia visitato un sito archeologico C centinaia di cocci di ceramic e pezzi di mattoni avviene perché la ceramica è piuttosto indistru archeologi tendevano a scegliere i frammenti p loro pubblicazioni, la maggior parte dei ritrovan risotterrata o semplicemente archiviata nei sott analizzata. Oggi, invece, dato che sappiamo che lo studio puo' raccontarci del commercio e l'attività dome documentare la maggior parte, se non tutta, la presenta un enorme sfida logistica data la quar metodologia lenta e scrupolosa applicata per e Questo è stato particolarmente veritiero a Portu Roma Imperiale, e il canale principale attravers alla Capitale, abbiamo trovato ceramiche da tu specialisti hanno separato i materiali di ogni co alimenti a lungo raggio), ceramica fine da mens studiato la combinazione delle loro caratteristic forma (in accordo con le caratteristiche forme c della quali erano formati e i minerali interni) nel luogo di produzione. In questo modo siamo stati in grado di stabilire commerciali tra Portus e il Mediterraneo attrave documentato nel sito. Siamo stati in grado di id tra il porto e gli altri porti del Mediterraneo e ch di altri reperti archeologici e storici. La scopert Tripolitania (moderna Libia), che erano molto c Provincia dell'Africa (moderna Tunisia) e dal M AC è un esempio di queste scoperte. Simon ha selezionato alcune parole dal video c • forma di un frammento di terracotta e.g • forma di un frammento di terracotta e.g (chiamato secondo l'archeologo che pe African Red Slip Ware Hayes 50 (chiam prima classificazione comprensiva di qu • tessuto di una forma di terracotta il tipo Score 45

Finds, or 'artefacts', are an important type of archaeological evidence on any site. They have two main roles. Artefacts such as coins, pottery types, even the style of construction of the walls can tell you information about dating. This dating, tends to be relative i.e. older than/younger than other similar items initially, but when combined with typologies of many different artefacts on several sites, certain artefacts can give dates with an accuracy of around 20-50 years.

In cases where there are a considerable number of standing walls such as at Portus, the artefacts on floors under the collapsed walls and even within the demolition rubble are important for understanding a site not only during its occupation but also when it was derelict or being pulled down.

As we will see in the coming weeks, these artefacts can tell you if people were living, bringing up their children, or burying their dead there, whether they were rich or poor, Roman or foreign. It does not depend on the size of the artefact, more its presence, right down to the smallest sherd of pottery, and its location, which is why it is important to handle/record/conserve artefacts properly and collect everything on site.

There is no substitute for actually handling finds, but that doesn't mean you have to travel to Portus! In the coming weeks we hope that you will start to take a whole new interest in the objects that are around you every day. Start thinking about the things you discard, or the ways you decorate your home, or the clothes you wear, and what these could tell future archaeologists about your background, your likes, your family and so on.

In terms of becoming familiar with Roman finds you might be able to visit a nearby museum and find objects similar to those at Portus. But if you don't have time then search for the types of objects we describe on-line to get a better sense of their diversity. This will help you to get a better understanding of the construction and use of these objects. Remember though that fragments of objects appear quite different from the whole - its only when your cup is broken that you throw it into the bin!

'Taphonomy' (the study of how objects decay or fall apart) allows us to understand the 'biography' of an object. This might sound like a weird way of describing a broken teacup but it means that we try to understand what happened to make the fragments we have in front of us. Something that would have been easily recognisable to us when it went into the ground will frequently change completely in form. The chemical and physical effects of long term storage underground may change its appearance through pressure, corrosion (drawing out the elements to the surface, resulting in rust for example or surface pitting, eventually destroying the object completely or leaving a hollow shell), delamination (surface peeling off) or concretion (other objects such as stones welded into the corrosion). These processes can continue after the object has left the ground unless treated properly and so we assess finds for any conservation needs.

Proporti, o 'artefatti', sono un importante tipo di
2 regole principali. Artefatti come le monete, tip
possono dirti informazioni sulla datazione. Que
giovane/ più vecchia di altri articoli simili inizialm
tipologia di molti artefatti diversi su diversi siti, a
precisione di circa 20-50 anni.

Nei casi in cui vi è un numero considerevole di
terra sotto le pareti crollate e persino all'interno
per capire un sito ,non solo durante la sua occu
abbattuto.

Come vedremo nelle prossime settimane, ques
allevavano i loro figli o seppellivano i loro morti
Non dipende dalla dimensione dei manufatti, pi
frammento di ceramica, e della sua posizione,
gestire/registrare/raccogliere tutto sul sito.

Non c'è alcun sostituto per la manipolazione ef
debba viaggiare su Portus! Nella prossima sett
interesse completamente nuovo verso gli ogge
Inizia pensando alle cose che scarti, o ai modi
indossi, e cosa potrebbero dire ai futuri archeol
e così via .

In termini di familiarità con i ritrovamenti roman
trovare oggetti simili a quelli di Portus. Ma se n
descriviamo on-line per un senso migliore vers
una migliore comprensione della costruzione e
Ricorda che i frammenti di oggetti che sembra
tazza è rotta che la getti nel cestino.

La Tafanomia (lo studio di come l'oggetto si sc
"biografia" di un oggetto . Questo potrebbe sem
da the rotta, ma significa che cerchiamo di cap
abbiamo di fronte a noi .

Qualcosa che sarebbe stato facilmente riconos
spesso completamente nella forma. Gli effetti d
termine sotto terra possono cambiare il suo asp
disegnando gli elementi sulla superficie ,risulta
corrugata, distruggendo eventualmente l'ogget
(staccare la superficie) o concreazione (altri og
Questi processi possono continuare dopo che l
correttamente e quindi valutiamo reperti per qu

Score 46

2.3

page

The hexagon - Trajanic expansion of Portus

We've now seen that the major expansion of Portus took place under the Emperor Trajan between AD 112 and AD 117, contributing to make the overall complex cover some 3.5 km2. The centre-piece of his enlargement consisted of the excavation of a new hexagonal harbour basin inland behind the Claudian basin.

The Basin of Trajan, with the *Grandi Magazzini di Settimio Severo* (the Great Warehouse of

L'esagono – L'espan
Ora abbiamo visto che la maggiore espansione
Tra il 112 a.C. e il 117 d.C., contribuendo a ren
3,5 km2.
Il pezzo centrale del suo allargamento consiste
esagonale nell'entroterra dietro il bacino di Cla
Il bacino di Traiano, con i "Grandi magazzini di

hexagonal basin until the 20th century when the sides and base of the basin, now a lake, were lined with concrete. Making this was a substantial undertaking which, <u>as Dragana discussed in an extra video recorded on the 2014 Portus Field School</u>, was almost certainly not done using slave labour.

CGI overview of the Hexagon; gradually over the last 10 years we have developed a series of 3D models of the site that we use to help understand its form and function - Grant Cox © University of Southampton

A substantial brick wall ran around the inside of several sides of the hexagonal basin (not necessarily all), set back from the quayside by c. 6m. This wall was periodically pierced by narrow entrances, presumably intended to control the flow of cargoes from the ships to the warehouses where they were to be stored. Some stretches of this wall are still visible in the undergrowth on the western side of the hexagonal basin. Unfortunately, little is known about the date of the wall. Columns marked with Latin numerals were placed periodically along the quayside, marking berthing points for incoming ships.

Around the basin and elsewhere on the site we find massive stone blocks with 50cm diameter holes, used for attaching mooring ropes. You can see these below, incorporated into a CGI view of the canal that provided access to the Trajanic Basin (*Canale di Imbocco al Porto di Traiano*).

CGI view of a building interpreted from the geophysics on the north side of the Canale di Imbocco al Porto di Traiano, with mooring blocks visible - Gareth Beale © University of Southampton

Broken mooring block - Hembo Pagi © University of Southampton

Opening onto the basin on four of the six sides were massive new warehouses in which were stored goods unloaded from ships anchored in the basin itself. Furthermore, on the side opposite the entrance of the basin a large warehouse was built on either side of a temple complex within a *temenos* (temple precinct), in front of which stood a massive statue of Trajan himself. An inscription from the temple area was recorded in the 19th century as a dedication to *Liber Pater Commodiana*. This inscription, together with the position of the temple and the statue as the focal point for the Trajanic Basin, suggest that this was a temple to the cult of the Emperor, together with a number of attributed deities such as the old Italic god *Liber Pater* and, one would imagine, others.

Those warehouses on the south-western side of the basin were used for the transhipment of cargoes from sea-going ships into warehouses that then fed river craft that carried goods up a new canal to the Tiber, and from thence to Rome. Ostia was additionally influenced by the new constructions at Portus, as seen by the creation of new warehouses throughout the city at the same time, such as the Horrea III.II.6. Excavation and geophysical survey have revealed the presence of other buildings at Portus, including the so-called Imperial Palace (*Palazzo Imperiale*), and a large building used for the repair or construction of ships.

View across the Trajanic Basin - our excavations are on the opposite side - Hembo Pagi © University of Southampton

Another important element in this expansion was the construction of a major new road that left the eastern side of the hexagonal basin and followed the canal to a point close to where it met the Tiber, before changing direction to head towards the *Via Campana* – thereby enhancing communication for wheeled traffic from the port to Rome.

Look at the plan of Period 2 to see the layout of buildings around the new basin. Civitavecchia was linked to Rome by the Via Aurelia and to Portus by the sea.

Simon also said that the basin was 5m deep. How do you think we know this? What kinds of evidence do you think would be relevant here?

from the south-east - Grant Cox © University of Southampton; (Note: You can see an approximate equivalent view of this area today via Google Maps 3D. You can make out the building in the distance on the eastern shore of the Claudian basin, that is indicated in Grant's CGI model. These links do not work on all mobile devices).

Sono sul lato opposto - Hembo pag. © Univers…
Di Southampton
Un altro elemento importante in questa espans…
La costruzione di una grande strada nuova che…
esagonale e seguito il canale a un punto vicino…
cambiare direzione verso la "Via Campana" —
ruote dal porto di Roma.
Guarda il piano del periodo 2 per vedere il layo…
Civitavecchia è stato collegato a Roma dalla vi…
Simon ha anche detto che il bacino era profond…
Come pensi che lo sappiamo? Che tipo di prov…
Nei prossimi due passi impareremo sull'alta
Fonte tecnologica di prova dell'esagono, e
Poi pensare un po' di più sul sistema portuale …
Cui l'esagono era una parte.

Score 46

2.10

Grandi Magazzini Traianei and the colonnaded road

The *Portico di Claudio* was part of a massive complex of buildings – it effectively translates as porch or arcade of Claudius although the term portico is in fairly common English usage. The complex of warehouses that we know as the *Grandi Magazzini Traianei* (the great warehouses of Trajan) exist from the early stages of the port but have a long history of use.

We usually refer to "warehouses" but might also talk about "storerooms" in order to refer to the individual rooms in these structures. For example, analysis of the architecture of storerooms can indicate the goods stored in them.

From the Portico you could have walked along the colonnaded road and into the *Foro Olitorio*, which was probably also used for storage of goods. The name of this derives from the latin "Forum Holitorium" meaning vegetable market. As often at Portus, there is some uncertainty about this interpretation – effectively based on architectural parallels between this building and a possible equivalent one in Rome.

The rectangular basin is known as the *Darsena*. Simon referred to this earlier, since it was a part of the original Claudian harbour complex but also a vital component in the revised system under Trajan. The function of the *Darsena* isn't entirely clear but may have been related to loading of grain and other goods from the adjacent warehouses onto the river craft for transporting by canal and the Tiber up to Rome. As a point of interest, there is a modern part of the Fiumicino port that is referred to as the "Darsena". A quick search will show it to be a similarly sized, enclosed, protected basin.

The *Grandi Magazzini di Traiano* has been the focus of recent excavation and study by Evelyne Bukowiecki on behalf of the University of Provence, École Française de Rome, and the *Soprintendenza Speciale per i Beni Archeologici di Roma*. The building is a warehouse, at least two stories high, situated on the three sides of the *Darsena*. The first phase of the building, evidenced by large reticulate-faced concrete foundations, is attributable to the Claudian-Neronian period.

The Trajanic Warehouses as they are today, after partial reconstruction - Simon Keay © University of Southampton

Reticulate-faced refers to a Roman method of wall construction in which square bricks are set in mortar to present a diamond chequerboard effect. This was known as Opus reticulatum. Reticulate in

Grandi Magazzini Traia…

Il portico di Claudio fu parte di un massiccio co…
veranda o un portico di Claudio anche se il ter…
inglese. Il complesso dei magazzini che conosc…
magazzini di Traiano) esistono dalle prime fasi…
Noi solitamente ci riferiamo ai "magazzini" ma …
stanze individuali in queste strutture. Per esem…
indicare i beni depositati in essi.
Da il Portico dovresti aver camminato lungo la …
probabilmente fu usato come deposito dei beni …
Holitorium" significando un negozio di vegetali.…
su questa interpretazione - efficacemente basa…
un possibile equivalente a Roma.
Il bacino rettangolare è noto come Darsena.
Simon si riferiva a questo prima, poiché faceva…
originale ma anche una componente vitale nel …
Darsena non è interamente chiara ma potrebbe…
beni dai magazzini adiacenti sulle imbarcazioni…
Roma. Come punto di interesse, c'è una parte …
"Darsena". Una ricerca rapida mostrerà che è u…
I Grandi Magazzini di Traiano è stato al centro …
per conto dell'Università di Provenza, scuola fr…
per i Beni Archeologici di Roma. L'edificio è un…
punti della Darsena. La prima fase dell'edificio,…
calcestruzzo reticolato, è attribuibile al periodo…

Score 48

reticulate-faced concrete and each with an average width of 3.6 m and depth of 3.15 m. Many of the rooms have "suspensurae", piers of bricks that would support a suspended floor, suggesting the storage of grain. The storerooms on the ground floor alone have a total storage surface area over 1 hectare.

In the second part of this activity you can read about a rather smaller building that was in use during the Trajanic phase of the site – the "Lanterna" or Lantern baths, named after the small lighthouse that ends the quay on which they stand.

2.11	**Terme Della Lanterna** These baths are located on the east-west internal mole delineating the Claudian basin and the entrance canal to the Trajanic basin. Through much of their life (known to extend from the first century AD through until sometime in the sixth century AD) this would have been one of the busiest port locations in the empire. With the Canale di Imbocco al Porto di Traiano running alongside it, this would have seen ships and lighters passing almost continuously, particularly at the height of the sailing season. This CGI image shows a reconstruction of the Canale di Imbocco al Porto di Traiano viewed from the northern end of the antemurale. The baths are to the left, behind the Lanterna or inner lighthouse - Gareth Beale © University of Southampton Potentially ships navigating their way in from outside of the Claudian Basin may have lined up these lights in order to find a safe passage in. The animation below shows a view from a lighter moving from north of the Imperial Palace to the Trajanic Basin, and provides a closer view of the baths. Laser scan of the bath complex - in future iterations of this course we will provide the ability to wander around these scanned structures online - James Miles © University of Southampton The bath complex (c. 40 m by 30 m) was comprised of multiple vaulted rooms of brick-faced concrete construction. The first-century structure was initially excavated in 1824 when the marble cladding was removed. More recent systematic excavation was undertaken by Lidia Parioli on behalf of the Soprintendenza Speciale per i Beni Archeologici di Roma. Laser scan of the bath complex, clearly showing the opus mixtum construction technique employed - James Miles © University of Southampton As with all Roman baths there is a sense of a progression through forms of experience, with (presumably) cold, tepid, and hot baths and areas for changing. It is difficult to reconstruct the likely clientèle for the baths, given their position at the very heart of the port. Presumably a heterogeneous bunch drawn equally from the port administrators and those recently returned from distant provinces. One can however almost hear the sea birds and the creaking of masts in walking along the surviving quay from the baths to the site of the lighthouse. Ostia additionally saw the creation of a new bath complex during the Trajanic period, likely funded by the imperial family. Called "Terme di Porta Marina", these baths were located by Ostia's waterfront.	**Terme De** Questi bagni sono collocati a est e a ovest del e l'entrata al canare del bacino Traiano. Attraverso molto della loro vita (noti per essers tempo nel sesto secolo a.C.) questa sarebbe s nell'impero. Con il Canale di Imbocco al Porto avrebbe visto navi passare quasi continuament navigazione. Questa immagine CGI mostra una ricostruzione dall' estremità settentrionale dell' antemurale. I interno dei fari – Gareth Beale University of So Potenzialmente le navi che entrano dal Bacino in ordine per trovare un passaggio sicuro. L' an muove dal nord del palazzo Imperiale fino al Ba bagni. Scansione laser del complesso del bagno – ne la possibilità di aggirarci su queste strutture sca Southampton Il complesso termale (circa 40m per 30m) era c cemento. La struttura del primo-secolo fu inizia di marmo fu rimosso. Uno scavo sistematico pi la Soprintendenza Speciale per i Beni Archeolo Scansione laser del complesso del bagno, mos mixtum – James Miles Univeristy of Southampt Come tutte le terme romane c'è un senso di pro (presumibilmente) bagni freddi, tiepidi, e caldi e probabile clientela per i bagni, data la loro posi mazzo eterogeneo estratto in ugual misura dag recentemente restituiti da province distanti. Si p scricchiolii degli alberi che camminano lungo la Ostia vide anche la creazione di un nuovo com probabilmente finanziato dalla famiglia imperial bagni si trovavano sul lungomare di Ostia Score 48
2.18	**Brick Stamp of Marcus Rutilius Lupus** So in this video Simon gave Holly a detailed introduction to the brick stamp. You've had a reminder of what a brick stamp was created for – essentially, a control mark made on bricks when they were produced in the factories. It is hard to know what proportion of the bricks were stamped. After this	**Bollo laterizio di M** In questo video Simon ha dato a Holly una spie un avviso di ciò che un timbro di mattoni è stat su mattoni quando sono stati prodotti nelle fabb

As you will know, Portus was built very largely from brick-faced concrete, a technique that was characteristic of Imperial Rome. As the pace of building in the City blossomed in the course of the 1st and into the 2nd c AD, there developed a demand for the large-scale production of the millions of bricks needed for public and private monuments and buildings.

This was met by a large number of workshops in the Middle Tiber valley in the vicinity of the port of Ocriculum (Otricoli) and Horta (Orte), the products of which were shipped by barge down the Tiber to Rome in the first instance, with large numbers going on to Portus for use in building projects there. Each of these workshops can be identified by a characteristic stamp, at least down until the later 2nd c AD, on which it is possible to read such information as the name of the brick yard (*figlina*) and owner (or a symbol representing him) and the date when the brick was made expressed in the name of the current annual consuls. These were probably used as some kind of control mark.

Studying the brick stamps today has given us a great idea of how the manufacture and movement of building materials was managed, and which workshops/contractors were responsible for supplying the different building projects at Portus.

We now suspect that barges will have been used to transport the bricks downriver from Rome, presumably as a return cargo after having earlier carried imported foodstuffs etc. upriver to Rome from Portus. Also as Simon says there were different manufacturers involved, and some of their workshops may have been owned by wealthy families with ties to the Emperor.

The stamp Simon showed Holly translated as *Marcus Rutilius Lupus Lamiae Et Veteri Consulibus*. Can you find out what date this is from?

Thanks to Simon for another reminder of *Terminus Post Quem* too! Can you think of any items in your own home that could similarly be used to provide a Terminus Post Quem date to the archaeologists of the future?

3.7

Grandi Magazzini Di Settimio Severo

The *Grandi Magazzini di Settimio Severo,* built in the late 2nd century AD, is an important examplar of the many warehouses that packed the landscape of Portus. You've seen the remains of some already in the videos and should now have a sense of how they were used.

This building comprised rows of storage rooms on two floors. Hopefully you can now imagine looking out from the corridor where I was standing onto the large square that fronted the *Canale di Imbocco al Porto di Traiano*. This was the entrance canal by through which ships passed on the way to the Trajanic Basin, from which they could turn to moor in the *Darsena*, or proceed through to the Fiumicino Canal via the *Canale di Comunicazione Traverso*.

It is easy to imagine workmen (saccarii) carrying amphorae or sacks of grain from Egypt, Baetica, Tripolitania and Africa Proconsularis from there into this corridor. Sadly, however, we do not know what was stored inside this building, since the storerooms have long been cleared of their contents which could have anyway changed on a periodic basis. It is noticeable though that the *Grandi Magazzini di Settimio Severo* do not seem to have been provided with raised floors (suspensurae) with underfloor heating – which may suggest that they were not used for the storage of grain, which needs to be kept dry.

CGI view inside the storerooms, showing a ramp going up from the lower storey - Grant Cox © University of Southampton

Nor do we know who owned the building. Even though the port was primarily concerned with handling fiscal cargoes, it is quite possible that this and indeed other warehouses were put up at the initiative of individuals or groups of individuals seeking to profit from the storage business by subsequently renting out the storage rooms to individual merchants. All we need is a building

century AD. Examples include the Hadrianic Magazzino dei Doli that was used for storing wine or olive oil and Severan renovations to the Horrea of Hortensius.

Aerial view showing the storerooms, and to the west the Terrazza di Traiano - Simon Keay © University of Southampton

CGI view of the upper storey of the storerooms - Grant Cox © University of Southampton
I should point out, however, that this warehouse was different in layout to many of the others that we know about at Portus. I am thinking of the great batteries of grain storerooms known as the *Grandi Magazzini di Traiano* near the *Darsena*, as well as to those that we found built within the late 2nd c. AD navalia, or others on different sides of the hexagonal basin, adjacent to the east quay of the Claudian basin and on the flat land between the hexagonal basin and the Tiber. All of them are slightly different in terms of layout and very different to the *Grandi Magazzini di Settimio Severo*.

Aerial CGI view of the Grandi Magazzini di Settimio Severo - Grant Cox © University of Southampton
It is unclear whether these differences can be explained in terms of commodities that were stored inside them or not. One feature that many of these warehouses do have in common, however, is a surprisingly narrow entrance, a bit of a squeeze for workman carrying in a full sack of grain or an amphora carrying olive oil. This was probably deliberate and can also be seen at warehouses at Ostia and Rome, perhaps representing an attempt to control the flow of people and commodities in and out of these buildings. Again – this was particularly important in a port primarily concerned with maintaining and controlling the flow of fiscal cargoes bound for Rome.

Routes through the Canale di Imbocco al Porto di Traiano, passing by the
Grandi Magazzini Di Settimio Severo - Maria Del-Carmen Moreno Escobar © University of Southampton

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4.7b

Wall types
- *Opus quadratum*: Ashlar; cut stone blocks.
- *Opus caementicium*: Unfaced concrete, often with grooves and lines from shuttering.
- *Opus testaceum*: Brick-faced concrete.
- *Opus incertum*: Concrete with irregular stone facing.
- *Opus reticulatum*: Pyramidal shaped stones of tufa or basalt with diamond shaped faces forming a diagonal grid
- *Opus mixtum*: Concrete wall with both brick and reticulate facing.
- *Opus vittatum*: Concrete with facing of rows of rectangular tufa blocks. This facing can also contain alternating bands of brick, which is sometimes referred to as opus vittatum mixtum.

Opus caementicium used as foundations in Building 5. Note the vertical slot which is an impression left by a post of the wooden shuttering. - Hembo Pagi © University of Southampton

Opus incertum (left) next to *opus testaceum* - Hembo Pagi © University of Southampton

Opus testaceum facing above brick arch resting on travertine corbels with infill of

Opus mixtum opus reticulatum in laid above and below a band of *opus testaceum* - Hembo Pagi © University of Southampton

Opus vittatum mixtum - Hembo Pagi © University of Southampton
Wall coverings
- *Opus signinum:* Waterproof mortar made of a mixture of crushed terracotta and lime.
- Stucco and plaster: Lime based wall covering, applied in layers with an outer layer of almost pure lime, and a coarse inner layer with inclusions. Pigments applied when wet, or painted on over the top when dry.

Floor surfaces
- *Opus signinum*: See above
- *Opus spicatum*: Small bricks laid on their sides in a herringbone pattern.
- *Opus tessellatum*: Mosaic floors composed of small square pieces called tesserae. Mosaics can be simply monochromatic or multi-coloured with geometric or figural designs.
- *Opus sectile*: Floor surface made from interlocking pieces of cut marble arranged in a pattern – simple, geometric or figural.

Opus tessellatum: Mosaic floors composed
can be simply monochromatic or multi-colo
- *Opus sectile*: Floor surface made from i
pattern – simple, geometric or figural.
- pesce; *Opus tessellatum*: Mosaic floors
tesserae. Mosaics can be simply monochro
designs.
- *Opus sectile*: Floor surface made from i
pattern – simple, geometric or figural.
Opus tessellatum: mosaico composto da picco
possono essere semplici monocromatici o con
figurativi;
Opus sectile: superficie del pavimento fatta da
semplice modello, geometriche o figurali.

Sco

4.11

<table>
<tr><td>Building Five - a possible Navalia</td><td>Quinta costruzione -</td></tr>
</table>

There was a lot of detail in the video so here is a quick summary. It was filmed with Simon and Meaghan standing between the Trajanic basin and the Claudian basin with the *Palazzo Imperiale* to the west.
Building 5 was created in the Trajanic period, and extensively modified later in the later 2nd c. AD and continued in use into the later 5th or 6th c. AD. It is c. 240 m long and c. 60 m wide. The building is composed of brick-faced concrete piers with a series of brick arches that define a series of parallel north-south bays, that open on to the Claudian to the Trajanic basins. Some of these bays (Narrow Bays - NB on the plan below) are c. 11m wide, while others are c. 19m wide (Wide Bays - WB below) with intervening passages c. 4.50m wide (Passage – P below). The arched openings were subsequently filled in with brick- and reticulate-faced walls in the later 2nd c. AD.

Comparison of the excavation of Bay 5.2 (see plan below) of the Navalia in 2013 and 2014, based on photogrammetry gathered via an aerial drone - James Miles © University of Southampton

The original function of Building 5 is uncertain, but it was probably commissioned for the repair or construction of ships, since its layout closely resembles that of Classical, and particularly, post-Medieval ship buildings. For this reason it is often refered to as the *navalia* (shipyard) - but we will think more about this later. In the later 2nd .c AD, at least one of the large bays was converted into numerous rooms that were used for storage of goods of different kinds.
Simon said it was a "palimpsest of structures" – a palimpsest refers to a written document where it has been partly erased and over-written. It is often used in architectural history to refer to multiple transformations of buildings. Similar transformations of structures can be seen in Ostia in buildings like the Grandi Horea that was constructed under Claudius, but with additional reconstructions under Commodus and then Septimius Severus.
Next you will read an article that provides some of the evidence for the shipbuilding activity – a large collection of nails, and some other metal artefacts.

C'erano un sacco di dettagli nel video così ecc
Simon e Meaghan tra il bacino di Traiano e il b
ovest. La quinta costruzione è stata creata nel
dopo nel tardo secondo secolo a.C. e continua
secolo a.C. È lunga circa 240 metri è larga circ
affacciati ai moli di calcestruzzo con una serie
baie parallele da nord a sud, che si aprono dal
queste baie (Baie Strette - NB nel piano in bass
sono larghe circa 19 metri (Baie Larghe -WB in
4.50 m (Passaggio - P in basso). Le aperture a
mattoni e muri reticolati nel tardo secondo seco

In paragone con l'escavazione della Baia 5.2 (g
e nel 2014, basato su foto raccolte con un dron
Southampton.

La funzione originale della Costituzione 5 era in
commissionata per il riparo o la costruzione di n
strettamente assomigliante a quella classica, e
medievali. Per queste ragioni era spesso riferit
questo ci penseremo meglio dopo. Nel tardo II
convertita in numerose stanze che erano utilizz

Simon disse che era un "palinsesto di strutture"
scritto che fu parzialmente cancellato e sovrasc
dell'architettura per riferirsi a multiple trasforma
strutturali si possono osservare ad Ostia in cos
sotto il potere di Claudio, ma con le addizionali

4.12a	Nails and other metal artefacts from Building Five Metalwork is a common feature of all Roman sites but the quantity, preservation and the types of artefact present vary enormously both between sites and trenches. Across Portus the most common type of metal find is the iron nail. This is not unusual for Roman excavations, and the iron nails come in all sizes reflecting how commonly they were used in the community. Iron nails are used for fastening together architectural elements such as floors, ceilings, doors etc. In addition we find smaller, more decorative nails of both iron and copper alloy being used for household items such as locks, furniture etc. The range of metalwork differs depending on the context within which it is found. In a domestic environment, one might expect for example to find broken or lost jewellery showing the presence of women. In the excavation of a port site we could expect to find a number of items reflecting its proximity to the sea and associated transport links, such as cart and haulage fixings, fish hooks and large shipbuilding nails. At Portus, we have very few finds relating to domestic life generally, and this is demonstrated in the metalwork also. Interestingly, we initially also found very little evidence for the site having any connection to the sea. We have at the time of writing, only found two copper alloy fish hooks, both broken, together with a few bent iron nails which could be homemade fish hooks, most of which were found just to the north of Building 5. In Building 5's trenches we have, however, begun to find evidence for ship building or repair. This comes in the form of sheathing tacks. These are small nails with large flat heads (see me holding one on the BBC website) that were used to hold thin sheets of lead onto the sides of ships' hulls. The lead is thought to have had two possible uses: to prevent the wood of the hull from being eaten by 'shipworms' or marine bivalves such as Teredo navalis, or there is a theory that it was used to seal joints and seams in the planking. Sheathing tacks are found throughout the ancient Mediterranean and the Roman empire, with the most notable example on the ships constructed by Caligula and found sunken in Lake Nemi, just outside Rome. The tacks are found hammered in to the lead in a 'quincunx' pattern (as shown on the side of a dice with 5 dots). The sheathing tacks are formed either by pouring molten metal into a mould or by hammering the end of a bar of raw metal into a mould to form the head, depending on where the tacks were manufactured. We have found small bars of copper alloy in association with the sheathing tacks and pieces of lead in Building 5, and most of these show cut marks suggesting that they are the raw material from which the tacks are made. On the underside of some heads we often find a pattern of protruding dots or hemispheres and bars, which appear decorative but were not designed to be seen when the tack is in use. It seems most likely that these protrusions are used to grip the soft lead when they are hammered in.	Chiodi e altri materiali metallic dall'edificio cinqu Il metallo è una caratteristica comune a tutti i si tipi di artefatti presenti variano enormemente si A Portus l'oggetto più comune di metallo trovat Ciò non è inusuale per gli scavi romani, i chiodi modo in cui venivano comunemente utilizzate n I chiodi in ferro sono usati per fissare insieme e ecc. In aggiunta, troviamo chiodi più piccoli e p per oggetti domestici come serrature, mobili, ec La gamma di lavori in metallo varia a seconda d domestico, ci si potrebbe aspettare ad esempio presenza di donne. Nello scavo di un sito portu elementi che riflettano la sua vicinanza al mare fissaggi per carrelli e mezzi di trasporto, ami da A Portus, abbiamo pochissime scoperte relative dimostrato anche nella lavorazione dei metalli. anche trovato pochissime prove del fatto che il momento della scrittura, abbiamo trovato solo d insieme ad alcuni chiodi di ferro piegati che pot maggior parte dei quali sono stati trovati solo a Nella costruzione del sito 5, tuttavia, abbiamo i riparazione di navi. Questo si presenta sotto fo chiodi con grandi teste piatte utilizzate per cont delle navi. Il piombo dovrebbe avere due possi mangiato da "molluschi" o da bivalvi marini con stato usato per sigillare giunture e giunture nel I chiodi di ferro si trovano in tutto l'antico Medite notevole sulle navi costruite da Caligula e trova I chiodini sono trovati colpiti al piombo in un mo dado con 5 punti) I chiodi della guaina si formano versando meta di una barra di metallo grezzo in uno stampo a fabbricati i chiodi. Abbiamo trovato piccole barr chiusure della guaina e pezzi di piombo nel sito taglio che suggeriscono che sono la materia pr inferiore di alcune teste spesso trova uno sche appaiono decorativi ma non sono stati progetta Sembra molto probabile che queste protuberan quando vengono martellate.

5.10	Byzantine Decanummus	Decanum...

Byzantine Decanummus

This decanummus is a very small bronze coin dating to the 540s AD, probably minted at Rome. It comes from a hoard of coins found in the demolition debris of the *Palazzo Imperiale.*

The *obverse* or heads side is not very clear but would have represented a frontal view of the Emperor Justinian (AD 527-565). On the reverse the "I" between the stars that looks like a column is in fact a Greek numbering symbol which indicates that it was worth ten *nummi,* the nummus being a very small bronze coin that partnered the other denomination in the early Byzantine coinage system, the gold *solidus.* Its value, therefore, needs to be calculated in terms of a fraction of the solidus which weighed c. 4.3gm.

This coin was minted towards the end of the Gothic Wars (AD 536-552), the name given to Justinian's efforts to reconquer Italy and other parts of the western Mediterranean for the Eastern Roman Empire. As Simon mentioned earlier this week, it reminds us of how central Portus was to the conflict so vividly described by the Byzantine writer Procopius, and the key role played by his General Belisarius.

The coin was probably lost at some in the later 6th c. AD in the context of commercial activity at the port; the smaller, second, coin gives us further evidence of continuing commercial activity. The reason for the hoarding of the coins is unclear, but could have been related to the lack of security felt by those living and working at Portus during the Gothic Wars or during its aftermath.

A decanummus - Hembo Pagi © University of Southampton

Italian column (right):

Questo decanummo è una piccola moneta in b... d.C.,probabilmente coniata a Roma. Proviene ... demolizione di Palazzo Imperiale.
Il dritto o il lato della testa non è molto chiaro m... dell'Imperatore Giustiniano(527-565 d.C.). Sul ... colonna è in effetti il simbolo numerico greco c... una moneta di bronzo molto piccola che era as... conio bizantino primitivo,il solido d'oro.Il suo va... una frazione del solido che pesava c. 4.3 qm.
Questa moneta fu coniata verso la fine delle gu... sforzi di Giustiniano per riconquistare l'Italia e a... l'Impero Romano d'Oriente.Come Simon ha me... come il Portus centrale fosse in conflitto così vi... Procopio,e il ruolo chiave fatto dal suo general... Probabilmente la moneta fu persa in un momen... dell'attività commerciale al porto; la moneta più... della continua attività commerciale.La ragione ... chiara,ma potrebbe essere correlata alla manc... lavorava a Portus durante le guerre gotiche o d...

Score 55

6.4 — Building Three and the Palace complex

Plan showing the Imperial Palace area © University of Southampton

Throughout the course we have referred to the *Palazzo Imperiale* as a single complex. However, because it covers such a large ground area, around three hectares, we often tend to talk about it in terms of those constituent parts of the structure that we have excavated, even though they are all structurally contiguous.

The *Castellum Aquae* (Building 1) and Building 3 originally formed the eastern end of the northern range of the *Palazzo Imperiale* that overlooked the Claudian basin.

While we call these "buildings" they are in fact rooms, sometimes on more than one storey, each one of which has its own stratigraphic sequence that needs to be understood in its own terms as well as in the context of the complex as whole.

The Amphitheatre (Building 4), by contrast, was a separate building that lies immediately to the south of this and on the north side of the Navalia (Building 5) and was added to the western frontage of the *Palazzo Imperiale* in the late 2nd/early 3rd c. AD. Having to deal with the *Palazzo Imperiale* in this way gives you an idea of how challenging it is to excavate and record a complex of this size.

The Imperial Palace from the air looking roughly south, with the amphitheatre in the foreground - Simon Keay © University of Southampton

Laser scan image showing data from 2012 demonstrating the relationship between the subterranean structures and the ground surface - James Miles © University of Southampton

Top down view of laser scan data showing size of some of the rooms; the right of the image is the

---

Italian column (right):

Il Terzo Edificio e il ...
La piantina mostra l'area del Palazzo Imperiale ...
Durante tutto il corso ci siamo riferiti al Palazzo...
Tuttavia, siccome copre un'area vasta di terren... parlare del Palazzo prendendo in considerazion... scavato, anche se sono tutte strutturalmente c...
Il Castellum Aquae (Costruzione 1) e il Terzo E... Est dell'estensione verso Nord del Palazzo Imp...
Mentre noi le definiamo "costruzioni", esse son... un piano, ognuna delle quali ha una sua seque... suoi stessi termini così come nel contesto dell'i...
L'Anfiteatro (Costruzione 4), al contrario, era un... a sud rispetto al Palazzo e a nord rispetto a Na... occidentale del Palazzo nel tardo 2 secolo / 3 s... Imperiale emerge l'idea di come fosse stato dif... di queste dimensioni.
[immagine]
Il Palazzo Imperiale visto dall'alto guardando v... Keay © Università di Southampton
[immagine]
Scansione laser che mostra i dati del 2012 che... sotterranee e la superficie del terreno – James...
[immagine]

| 6.6 | The Castellum Aquae
Rear view of the Castellum Aquae University of Southampton
The so-called *Castellum Aquae,* is actually a three storey cistern block (Building 1) that also formed the eastern end of the northern range of the *Palazzo Imperiale.*
It was built in the Trajanic period. Its north side rested on the pre-Trajanic quay that defined the south side of the Claudian basin and on a Trajanic quay to the south. The cisterns themselves were situated on the first and second floor, with the ground floor acting as a service area: another, smaller two storey cistern (Building 2) was added to the east of this in the Hadrianic period.
Immediately to the west of the *Castellum Aquae* was another part of the *Palazzo Imperiale,* a very long room (Building 3) that in turn abutted a major complex of rooms focused upon a cistern/peristyle (Building 8). In the centre of the former was an open area around which ran a vaulted portico on three stories; the bases of the piers that supported the vaults can still be clearly seen.
This room was provided with an opus spicatum (brick herringbone) floor, typical of working or service areas in major buildings such as this. In the early third century, a small glass producing furnace was installed. To the south of Buildings 1 and 3 there was an open area that provided access to the eastern facade of the *Palazzo Imperiale* from the quayside to the east. | The Caste...
Il così chiamato Castellum Aquae è un blocco ...
la fine orientale dei confini settentrionali del pal...

Fu costruito nel periodo Traianeo. Il suo lato no...
definisce il lato sud del bacino Claudiano e sull...
stesse erano situate nel primo e secondo pian...
servizio: un'altra cisterna più piccola a due piar...
Adrianeo.

Subito verso ovest del Castellum Aquae c'era u...
molto lunga (edificio 3) che a sua volta confina...
focalizzavano su una cisterna/peristasi (edificio...
aperta intorno al quale correva un portico a vol...
supportavano le volte si possono ancora veder...

La stanza è composta da un pavimento opus s...
aree di lavoro o di servizio nei maggiori edifici ...
piccola fornace per la produzione di vetro fu ins...
aperta che permetteva l'accesso alla facciata c...
banchina a est.

Score 48 |

Text produced by the students during the second pilot

The population

In Mediolanum mainly barbarian circulated, confused among the indigenous Celts. Everything had to be more barbaric at Mediolanum: clothing (prefer the Ga... (butter instead of oil), houses (with clay walls and the prevalence of wood), streets, the burials.

From the epigraphs found in Milan, elements can be draw to learn about the Milanesi from the first century b.C to a.C. The typical sepulchral monument of the... several portraits inserted in a niche like the portraits of the ancestors in domestic larars, with the dedicatory inscription and the indication of the activity of the h...

The Albucia gens is clearly of Celtic origin and is typical of the Milanese: M. Albucius Priscus, Albucius Crispinus and Albucius Vindilli, a veteran of the VIII His... Novara speaker who in 15 b.C., in front of the bronze statue of Marco Bruto in the medieval forum, he asked the proconsul Pisone for more freedom.

Numerous in Milan and in the agro the gens Atilia, the gens Cassia, perhaps the most widespread on the whole territory of the Transpadana. Then there were... one of the most widespread noblemen to the west of the Adda, especially in Como, the Iunii. Quinto Novellio Vatia dedicates a plaque to his brother Caio Nov... Celtic origin still used in the Augustan age.

Via Porticata e Arco Onorario- Porticoed Street and Honorary Arch

In the fourth century in the stately rearrangement of the entire Decumano Massimo (today Corso Romano), they were built outside the walls, a 600m long por... Arch, which were to constitute monumental access to the city for those arriving there from Rome.

The paved road had a width of 9 m and the side porches, equipped with tabernae, were built in brick. The relevant quantity of painted plaster, unfortunately po... dimensions, suggests that many rooms must also have been frescoed.

Under the arcade it is documented the existence of a sewer, parallel to the road, where the discharges of the shops flowed sideways. The grandiose work of t... a.C established his residence in Milan, gave way to a policy of collaboration with the Bishop Ambrogio, who in those years started the construction of the four... position along the main roads of the city. The porticoed road then ended with a marble arch (arch of Giano or Yriumphal arch), which had to be placed at the c... Porta Romano, Lamarmora and Vigentina.

The Foro

The Foro Mediolanese was placed at the intersection of the two new main roads: the ancient street in the exit from Porta Ticinese, called improperly cardo, an... Fulcorina-corso di Porta Romana, with the function of Decumano. The Glareata Street (that is covered with pebbles) was enlargedfor Lausa Pompeia, rising fr... stone blocks. The intersection occurred on the area of the current S. Sepolcro square, which has been the subject of recent excavations for the accommodatio... Medialonese, according to the model consecrated by Caesar and diffused by Augustus, housed an apse basilica, a curia, a market, an aedas of Vesta, that is... dedicated to the ancient goddess, a forum for the meetings and large arcades under which were opened the numerous shops, while the upper floors of buildin...

The tribune

On the forum a tribune stood for the speeches.

The square was paved by marble slabs of Verona, a part of which is kept in the crypt of Sant. Sepolcro church.

The fragment of Frieze belongs to one of these buildings, where mercury and Minerva are seen walking along a procession, where they were perhaps also ot

The ditch

Next to Seveso river, the south wall followed the curve and the altitude, but the river was channelled and made navigable for small boats.

In order to not disperse the water, they had to reclaim the Southern Panthers and create a ditch, which surrounded all the city.

The quays on Palisades in Square Fontana and Street large.

The quay was wide 2,50 metres in slabs of "serizzo" cutlery, on high palifications of oak of 2,50 metres in the Museum of Wood.

The curia

The curia opened to the forum, maybe identified with the building found in 1938 between Square S. Maria Beltrade and Street Torino, a rectangular building of
part, but of considerably larger dimensions, dated around the 1st century. A.D. The building techniquecharacterisedized by river pebbles hand-held in the mor
bricks.

But the building could also be a market, divided into a large central courtyard. In front of the building, in 1898, the base of a giant marble column measuring 1.
at the origin of the stem had emerged.

Temple of Vesta

The curia was flanked by a round building that in 687 was dedicated to St. Mary by the Lombard king Bertarido, hence the title of St. Maria Bertheradi (Beltrad
were lit here on February 2 at the Candlemas Festival suggests that the original building was also a temple where the sacred fire of the city, dedicated to Vest

Vesta's aedes always had a circular plan because it could not be oriented. The house of Vesta was near the city curia, because it was the guarantee of the du
administrators of the res publica. Indeed previously the name of the Church was S. Maria Rotonda, from the shape of the temple.

The Columns of San Lorenzo

The sixteen columns of the II century A.D. in front of the Basilica of San Lorenzo constitute the most important roman rest in the city.

They were part of a temple or of a thermal plant. They were transported here during IV century, to form the frontal side of a front porch, for the principle that C
and to eliminate pagan debits, they plundered the old temples and each form of Pagan temples, and they can be saved only if they could highlight the temples

The roman dominion

After the victory of Actium in which the assassine of Caesar died, in 31 BC Ottaviano succeeded in getting all the magistracies of the State assigned as tribun... Princes of the Senate spoke first and directed the Senate; as a consul he exercised executive power; as proconsul obtained Government of the provinces and... that of censor promoted the censuses and the purges of the Senate The title of Augustus (worthy of veneration and honour) that conferred the Senate was like... Pompey, but it was never so deserved, but it passed to his successors, just as the title of Caesar was inherited.

The emperors were granted the titles of Caesar and Augustus in the hope that they could match their legendary people. In fact, it was Augusto who rebuilt Me... and riches. MEDIOLANUM AUGUSTEA Augustus established an eternal pax and refunded Rome through the empire. Each Roman city was rebuilt with buildi... ones, with markets, warehouses, workshops, fountains, baths, nymphs, theatres, odeon, circuses, gardens and swimming pools. The Mantuan Virgil replaced... Sun, which was to cause universal combustion, with the century of Apollo.

In the Aeneid Jupiter, turning to Venus, he assures her that he will not fix any kind of spatial or temporal limitation to the Romans. Only after the publication of... considered urbs aeterna and Augustus was proclaimed the second founder of the city.

Private building

Seeing as how epigraphic examination one finds out that the percentage of ''liberti'' is very high, it is possible that more floors houses existed like Rome and C... popular, even if at the beginning those houses were built according to Celtic tradition using wood. Augusto put limit of 33 m as maximum for the height of living... floors out of the ground.

The apartment house was an unknown building model in ancient age, with a bigger opening to the street, rather than to the inside yard, as a demonstration of... above all during the Troian age. While in Rome the oven bricks were used above all since Tiberius onwards, in province that usage is proved already during th...

Mediolanum couldn't surely have the population density of Rome, but we couldn't bring to the light an ''Insula'' yet, to be able to make comparison with the Ro... after Cesar's conquest, show an insule module variable between 100 and 160 m, and against the standard of 70 m to 80 m of Cisalpine Gaul to which the Me...

Since wood was the main building material and considering that there were a lot of trees in the area and the total lack of river and building stones, we don't ha... gives us back the traces of Celtic world: only the Roman mark remained.

Domus

As Domus, everyone had his ''Lavario'', the portraits of household Lari were contained in a small door locker, that the most respected members of the family c... occasions.

Every locker was equipped with an inscription with the name and the titles of the dead and it composed a kind of genealogical tree. The pictures right was in o... aristocracy and that remained as long as only the patricians were let to ordinary magistrates, the nit was extended to anyone had covered a magistrate. So, th... ''Lavari'' for the rising class who wished to imitate the aristocracy.

The tradition wanted that the ancestors' spirits stayed in the house and it had its location into the floor, so the crumbs which dropped during the meal were offe...

In the late age not sweep floor fashion was spread, that is covered of mosaics which reproduce the meal-remains dropped to the ground.

List of References

Abbate, E. (2019) Learning Activities and Resources Based on the Use of Corpora for CLIL Geography in a Cambridge International IGCSE® High School in Italy. *DDL&CLIL Integration". EL.LE*. [Online] 8 (2), 287–304. [online]. Available from: http://www.onestopenglish.com/clil/clil-teacher-magazine/your-clil/com- (Accessed 25 January 2021).

Achmad, L. (2020) From Content to Context: Understanding Introduction to Sociology Through MOOC. *International Journal of Emerging Technologies in Learning (iJET)*. [Online] 15 (07), 188–195.

Acts, U. P. G. (2009) *Apprenticeships, Skills, Children and Learning Act 2009*. [online]. Available from: https://www.legislation.gov.uk/ukpga/2009/22/contents (Accessed 5 June 2021).

Adamo, L. C. R. (2013) *'People, images, texts and ideas on the move': traduzione di alcuni saggi tratti da Cultural Mobility di Stephen Greenblatt*. University of Pisa. [online]. Available from: https://etd.adm.unipi.it/t/etd-09082013-225010/ (Accessed 25 January 2021).

Adamopoulos, P. (2013) 'What makes a great MOOC? An interdisciplinary analysis of student retention in online courses', in *ICIS 2013 Proceedings*. 17 December 2013 pp. 1–21. [online]. Available from: https://aisel.aisnet.org/icis2013/proceedings/BreakthroughIdeas/13 (Accessed 25 January 2021).

Adams, A. & Ngimwa, P. (2012) Digital Library Sustainability and Design Processes. *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. [Online] 7489 LNCS76–88.

Advisory Group on Education for Citizenship and the Teaching of Democracy in Schools (1998) *Education for citizenship and the teaching of democracy in schools*. [online]. Available from: https://dera.ioe.ac.uk/4385/1/crickreport1998.pdf (Accessed 25 January 2021).

Airasian, P. et al. (2005) 'A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives Complete Edition', in *BOOK REVIEWS*. p.

Albelbisi, N. et al. (2018) Mapping the factors influencing success of Massive Open Online Courses (MOOC) in higher education. *Eurasia Journal of Mathematics, Science and Technology Education*. [Online] 14 (7), .

Alcock, S. E. et al. (2016) Archaeology and the MOOC: Massive, open, online, and opportunistic. *Journal of Social Archaeology*. [Online] 16 (1), 3–31. [online]. Available from: http://journals.sagepub.com/doi/10.1177/1469605315609017 (Accessed 7 April 2021).

Almutairi, F. (2018) *The Impact of Integrating MOOCs into Campus Courses on Student Engagement*. Southampton: University of Southampton. [online]. Available from: http://eprints.soton.ac.uk/id/eprint/429737 (Accessed 25 January 2021).

Altair4 Multimedia (2012) *Ostia antica e porto di Traiano - YouTube*. [online]. Available from: https://www.youtube.com/watch?v=JOZ382-AvDk (Accessed 20 August 2017).

Altrichter, H. et al. (2013) *Teachers investigate their work: An introduction to action research across the professions, second edition*. [Online].

American Library Association (2008) *Definitions of Digital Preservation*. Chicago, IL: Association for Library Collections & Technical Services (ALCTS). [online]. Available from: https://scholar.google.com/scholar_lookup?hl=en&publication_year=2008&author=American+Library+Association&title=Definitions+of+Digital+Preservation (Accessed 4 November 2020).

Angela, A. (2015) *Ulisse: il piacere della scoperta - Viaggio tra i segreti e i tesori di Ostia Antica*. [online]. Available from: https://www.raiplay.it/video/2015/11/Ulisse-Il-piacere-della-scoperta-Viaggio-tra-i-segreti-e-i-tesori-di-Ostia-Antica-del-14112015-fecef267-8242-4888-a5e3-1b82dc82ba17.html (Accessed 5 June 2021).

Annette, J. (2006) 'Education for citizenship, civic participation and experiential and service learning in the community', in Denis Lawton et al. (eds.) *Education for Citizenship*. London: Continuum. pp. 77–92.

Ansa (2019) *Alternanza e stage, più chance per lavoro.*

Archaeology Forum (2005) *Archaeology enrichers us all.* . [online]. Available from: https://www.archaeologyuk.org/archforum/enriches.pdf (Accessed 25 January 2021).

AshleyMichael et al. (2011) Last House on the Hill. *Journal on Computing and Cultural Heritage (JOCCH)*. [Online] 4 (4), 1–26.

Astin, A. et al. (2000) How Service Learning Affects Students. *Higher Education*. [online]. Available from: https://digitalcommons.unomaha.edu/slcehighered/144 (Accessed 25 January 2021).

Atkins, K. et al. (2020) *Supporting undergraduate teaching with primary sources. Ithaka S+R UX Project*.

Atkinson, S. P. (2009) *What is the DiAL-e framework?* [online]. Available from: http://dial-e.net/what-is-the-dial-e/ (Accessed 8 June 2021).

Bailey, N. (2015) Attaining Content and Language Integrated Learning (CLIL) in the Primary School Classroom. *American Journal of Educational Research*. [Online] 3 (4), 418–426.

Baker, R. et al. (2018) 'Inclusivity instead of exclusivity: The role of moocs for college credit', in *Enhancing Education Through Open Degree Programs and Prior Learning Assessment*. [Online]. p.

Bali, M. (2016) *Knowing the Difference Between Digital Skills and Digital Literacies, and Teaching Both* [online]. Available from: https://literacyworldwide.org/blog/literacy-now/2016/02/03/knowing-the-difference-between-digital-skills-and-digital-literacies-and-teaching-both (Accessed 7 June 2021).

Ball, P. et al. (2015) *Putting CLIL Into Practice*. Oxford: Oxford University Press.

Bandarin, F. & Van Oers, R. (2014) *Reconnecting the City: The Historic Urban Landscape Approach and the Future of Urban Heritage*. Vol. 9781118383988. [Online]. Wiley Blackwell.

Baram, U. (2004) *Marketing Heritage: Archaeology and the Consumption of the Past*. AltaMira Press.

Barbieri, N. S. (2010) 'Teachers Training in Italy', in K. G. Karras & C. C. Wolhuter (eds.) *International Handbook on Teacher Education Worldwide. Issues & Challenges for Teacher Profession* . Athens: Atrapos Edition. pp. 315–339.

Barel-Ben David, Y. et al. (2020) Can scientists fill the science journalism void? Online public engagement with science stories authored by scientists Fabiana Zollo (ed.). *PLOS ONE*. [Online] 15 (1), e0222250. [online]. Available from: https://dx.plos.org/10.1371/journal.pone.0222250 (Accessed 10 April 2021).

Barrett, G. (2015) *Wasted potential? Archaeology in the National Curriculum. The past, present, and future of archaeological involvement in schools and teaching in Britain. BA Dissertation*. University College London. [online]. Available from: https://www.academia.edu/13031732/Wasted_potential_Archaeology_in_the_Nati onal_Curriculum (Accessed 10 April 2021).

Barry, W. (2013) *Comparing the MOOC dot com #h817open* [online]. Available from: https://www.waynebarry.com/2013/03/12/comparing-the-mooc-dot-com-h817open/ (Accessed 7 June 2021).

Bartolomé, A. (2013) Qué se puede esperar de los MOOC [What to expect about MOOCs]. *Comunicación y Pedagogía: nuevas tecnologías y recursos didácticos*. 269–27049–56. [online]. Available from: https://dialnet.unirioja.es/servlet/articulo?codigo=4560279 (Accessed 8 June 2021).

Bates, T. (2012) *What's right and what's wrong about Coursera-style MOOCs | Tony Bates* [online]. Available from: https://www.tonybates.ca/2012/08/05/whats-right-and-whats-wrong-about-coursera-style-moocs/ (Accessed 20 February 2021).

Bawden, D. (2008) 'Origins and Concepts of Digital literacy', in C. Lankshare & M. Knobel (eds.) *Digital Literacies: Concepts, policies and practices*. New York, NY: Peter Lang. pp. 17–32.

BBC News (2014) *How is the national curriculum changing?* [online]. Available from: https://www.bbc.co.uk/news/education-28989714 (Accessed 10 April 2021).

Beacham, R. et al. (2006) 'An introduction to the London charter', in M. Ioannides & et al. (eds.) *The e-volution of Information Communication Technology in Cultural Heritage: where hi-tech touches the past: risks and challenges for the 21st century, Short papers from the joint event CIPA/VAST/EG/EuroMed*. 2006 Budapest: Archaeolingua. p. [online]. Available from:

https://www.academia.edu/download/30860061/beacham-denard-niccolucci_intro.pdf (Accessed 8 October 2020).

Beacham, R. C. (2016) Defining our Terms in Heritage Visualization. *Paradata and Transparency in Virtual Heritage*. [Online] 33–38.

Beaven, T. et al. (2013) The Open Translation MOOC: creating online communities to transcend linguistic barriers. *Journal of Interactive Media in Education*. [Online] 2013 (3), 18. [online]. Available from: http://jime.open.ac.uk/articles/10.5334/2013-18/ (Accessed 10 April 2021).

Bekker, T. et al. (2015) Teaching children digital literacy through design-based learning with digital toolkits in schools. *International Journal of Child-Computer Interaction*. [Online] 529–38.

Bekkers, R. H. F. P. (2009) A new national service learning program in The Netherlands: Preliminary evidence. *Forum 21 : European Journal on Child and Youth Research / revue européenne de recherche sur l`enfance et la jeunesse*. 362–68.

Bell, F. (2011) Connectivism: Its place in Theory-informed research and innovation in technology-enabled learning. *International Review of Research in Open and Distance Learning*. [Online] 12 (3), 98–118. [online]. Available from: http://www.irrodl.org/index.php/irrodl/article/view/902/1664 (Accessed 10 April 2021).

Bell, J. & Waters, S. (2014) *Doing your research project. A guide for first-time researchers.* . Sixth Edition. Maidenhead: Open University Press.

Belleflamme, P. & Jacqmin, J. (2016) An economic appraisal of MOOC platforms: Business models and impacts on higher education. *CESifo Economic Studies*. [Online] 62 (1), 148–169.

Belshaw, D. A. J. (2012) *What is 'digital literacy'? : a pragmatic investigation*. Durham University. [online]. Available from: http://etheses.dur.ac.uk/3446/ (Accessed 4 May 2020).

Bennell, P. (2020) The internationalisation of higher education provision in the United Kingdom: Patterns and relationships between onshore and offshore overseas student enrolment. *International Journal of Educational Development*. [Online] 74102162.

Benvenuto, G. (2018) *Percorsi di alternanza scuola-lavoro all'università: didattiche e competenze*. Roma: Nuova Cultura.

Bergmann, J. & Sams, A. (2012) *Flip Your Classroom: Reach Every Student in Every Class Every Day*. International Society for Technology in Education.

Berrett, D. (2012) How 'Flipping' the Classroom Can Improve the Traditional Lecture. *The Chronicle of Higher Education*. 58 (25), 16–18.

Berrocoso, J. V. (2014) MOOCS: A critical view from the Educational Sciences | Teachers, Journal of Curriculum and Teacher Training. *Revista de Currículum y Formación del Profesorado*. 18 (1), 93–111. [online]. Available from: https://recyt.fecyt.es/index.php/profesorado/article/view/42900 (Accessed 10 April 2021).

Berry, M. (2014) *Open Badges for assessing primary computing. Computing at School* [online]. Available from: https://community.computingatschool.org.uk/resources/2595/single (Accessed 10 April 2021).

Bertacchini, P. A. et al. (2014) Cultural heritage 2.0 Prosumers and new collaborative environment related to cultural heritage. *International Journal of Management Cases*. [Online] 10 (3), 543–550.

Bestr (2017) *Alternanza scuola-lavoro: si scrive Open Badge e si legge competenze | Bestr Blog* [online]. Available from: https://blog.bestr.it/it/2017/03/22/alternanza-scuola-lavoro-si-scrive-open-badge-e-si-legge-competenze (Accessed 10 November 2019).

Beukes, E. W. et al. (2020) Readability following cultural and linguistic adaptations of an internet-based intervention for tinnitus for use in the United States. *American Journal of Audiology*. [Online] 29 (2), 97–109. [online]. Available from: https://doi.org/10.1044/2019_AJA-19-00014 (Accessed 10 April 2021).

Bevelacqua, G. S. (2016) 'L'ascesa della civitas Flavia Constantiniana Portuensis tra liberalitas principis e munificentia privata. L'apporto delle fonti epigrafiche.', in *Acta XVI Congressus Internationalis Archaeologiae Christianae. Romae (22-28.9.2013)*. 2016 Città del Vaticano: . pp. 2155–2170.

Bevilacqua, P. (2017) *Felicità d'Italia. Paesaggio, arte, musica, cibo.* Bari: Laterza.

Bicarregui, J. (2016) *Review: Building and sustaining data infrastructures*. [online].
    Available from:
    /articles/journal_contribution/Review_Building_and_sustaining_data_infrastructure
    s/4055538/2 (Accessed 5 November 2020).

Biggs, J. B. & Collis, K. F. (1982) *Evaluating the Quality of Learning: Structure of the
    Observed Learning Outcome Taxonomy.* New York: Academic Press.

Bishop, J. L. & Verleger, M. A. (2013) The Flipped Classroom: A Survey of the
    Research . *ASEE national conference proceedings*. 30 (9), 1–18.

Bloom, B. S. (1971) 'Mastery learning. ', in J. H. Block (ed.) *Mastery learning, theory
    and practice* . New York : Holt, Rinehart, and Winston. pp. 47–63. [online].
    Available from: http://www.sciepub.com/reference/105839 (Accessed 10 April
    2021).

Bloom, B. S. et al. (1956) *Taxonomy 355 of Educational Objectives. The Classification
    of Educational Goals. Handbook 1.* New York : Longmans Publishing. [online].
    Available from:
    https://www.scirp.org/(S(351jmbntvnsjt1aadkposzje))/reference/ReferencesPapers
    .aspx?ReferenceID=1768794 (Accessed 8 June 2021).

Bloom, B. S. (1956) *Taxonomy of educational objectives. Handbook 1: Cognitive
    domain*. New York: Longman.

Bocci, D. (1935) *Biografia dell'Ing. Davide Bocci*. Fabirano, 1937.

Bogdan, R. B. & Biklin, S. K. (1998) *Qualitative Research in Education. An Introduction
    to Theory and Methods. Third Edition.* Needham Heights. .

Bonacchi, C. (2014) Audiences and Experiential Values of Archaeological Television:
    The Case Study of Time Team.
    http://dx.doi.org/10.1179/1465518713Z.00000000035. [Online] 12 (2), 117–131.
    [online]. Available from:
    https://www.tandfonline.com/doi/abs/10.1179/1465518713Z.00000000035
    (Accessed 6 October 2020).

Bonacchi, C. et al. (2012) 'Public Engagement Through Online TV Channels: A Way
    Forward For The Audiovisual Communication Of Archaeology?', in Chiara
    Bonacchi (ed.) *Archaeology and Digital Communication: Towards Strategies of
    Public Engagement. .* London: Archetype Publications. pp. 50–65. [online].

Available from: https://archetype.co.uk/our-titles/archaeology-and-digital-communication/?id=155 (Accessed 10 April 2021).

Borthwick, K. (2021) *Making MOOCs go further: utilising MOOCs in teaching and learning | Advance HE* [online]. Available from: https://www.advance-he.ac.uk/news-and-views/making-moocs-go-further-utilising-moocs-teaching-and-learning (Accessed 10 April 2021).

Bosisio, N. (2015) CLIL in the Italian University, A Long but Promising Way to Go. *EL.LE.* [Online] 4 (1), 133–154.

Bower, K. (2019) School leaders' perspectives on content and language integrated learning in England. *Language, Culture and Curriculum*. [Online] 33 (4), 351–367. [online]. Available from: https://www.tandfonline.com/action/journalInformation?journalCode=rlcc20 (Accessed 5 June 2021).

Bower, K. (2017) Explaining motivation in language learning: a framework for evaluation and research. *Language Learning Journal*. [Online] 47 (5), 558–574. [online]. Available from: https://www.tandfonline.com/doi/abs/10.1080/09571736.2017.1321035 (Accessed 5 June 2021).

Bower, K. (2017) 'Speaking French alive': learner perspectives on their motivation in Content and Language Integrated Learning in England. *Innovation in Language Learning and Teaching*. [Online] 13 (1), 45–60. [online]. Available from: https://www.tandfonline.com/doi/abs/10.1080/17501229.2017.1314483 (Accessed 5 June 2021).

Bower, K. et al. (2020) 'CLIL in Multilingual and English-Background Contexts', in *Curriculum Integrated Language Teaching*. [Online]. Cambridge University Press. pp. 3–21.

Bowman, D. et al. (2004) *3D User Interfaces: Theory and Practice.*

Boyer, E. L. (1990) *Scholarship Reconsidered: Priorities of the Professoriate., 1990-Dec-3*. [online]. Available from: https://eric.ed.gov/?id=ED326149 (Accessed 5 June 2021).

Bradley, K. (2007) Defining Digital Sustainability. *Library Trends*. [Online] 56 (1), 148–163.

Bradley, K. (2007) Defining Digital Sustainability. *Library Trends*. 56 (1), 148–165.

Briggs, L. (1977) *Instructional Design: Principles and Applications*. Englewood Cliffs, NJ: Educational Technology Publications.

British Council (2013) 'The shape of things to come. The evolution of transnational education: data, definitions, opportunities and impacts analysis', in *Going Global 2013*. 2013 London. p. 103.

Brock, T. P. & Goldstein, L. (2015) Blogging the field school: Teaching digital public archaeology. *Internet Archaeology*. [Online] (39), .

Brown, J. S. et al. (1989) Situated Cognition and the Culture of Learning. *Educational Researcher*. [Online] 18 (1), 32–42. [online]. Available from: https://doi/10.3102/0013189X018001032 (Accessed 8 June 2021).

Bruseker, G. et al. (2015) 'Semantically documenting virtual reconstruction: Building a path to knowledge provenance', in G. T. Brusker et al. (eds.) *ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences*. [Online]. 11 August 2015 Copernicus GmbH. pp. 33–40.

Buchem, I. & Bignami, F. (2017) *Open Badge e loro sviluppo a livello individuale Discussion Paper Outcome O3A1-Discussion Paper on Open Badges for Individuals Document information*.

Buckley, A. (2014) How radical is student engagement? (And what is it for?). *Student Engagement and Experience Journal*. [Online] 3 (2), 1–23. [online]. Available from: https://pureportal.strath.ac.uk/en/publications/how-radical-is-student-engagement-and-what-is-it-for (Accessed 10 April 2021).

Bueno-De-La-Fuente, G. et al. (2012) *The roles of libraries and information professionals in Open Educational Resources (OER) initiatives*. [online]. Available from: https://minds.wisconsin.edu/handle/1793/63306 (Accessed 9 November 2019).

Buonauro, A. & Domenici, V. (2020) Scuola, alfabetizzazione digitale e cittadinanza attiva. Verso un'educazione alla democrazia e all'incontro con l'altro. *Sapere pedagogico e Pratiche educative*. [Online] 2020 (5), 55–66. [online]. Available from: http://siba-ese.unisalento.it/index.php/sppe/article/view/22277 (Accessed 7 June 2021).

Burd, E. L. et al. (2015) Exploring Business Models for MOOCs in Higher Education. *Innovative Higher Education*. [Online] 40 (1), 37–49. [online]. Available from: https://link.springer.com/article/10.1007/s10755-014-9297-0 (Accessed 10 April 2021).

Burtt, F. (1987) 'Man the Hunter': Bias in children's archaeology books Nigel Holman & Fiona Burtt (eds.). *Archaeology as Education*. 6 (2), 157–174. [online]. Available from: https://www.repository.cam.ac.uk/handle/1810/286176?show=full (Accessed 28 April 2021).

Callender, P. (1970) *Programmed Learning: its development and structure.* . Vol. 7. [Online]. London: Longman, Green & Co. Ltd.

Calvani, A. & Menichetti, L. (2015) *Come fare un progetto didattico. Gli errori da evitare.* Roma: Carrocci. [online]. Available from: https://www.amazon.it/Come-progetto-didattico-errori-evitare/dp/8874667361 (Accessed 28 April 2021).

Camera dei Deputati (1911) *Suffragio universale e Analfabetismo – Appunti statistici.* . [online]. Available from: https://web.archive.org/web/20131210041904/http://documenti.camera.it/bpr/1272 1_testo.pdf (Accessed 7 August 2017).

Canessa, E. et al. (2016) Recording Scientific Lectures with openEyA from the School to the University. *European Journal of Open, Distance and E-learning,*. 19 (1), .

Canessa, E. & Pisani, A. (2013) High School Open On-Line Courses (HOOC): A Case Study from Italy. *European Journal of Open, Distance and E-Learning*. 16 (1), 131–140.

Capperucci, D. (2008) *Dalla programmazione educativa e didattica alla progettazione curricolare. Modelli teorici e proposte operative per la scuola delle competenze*. Milano: Franco Angeli.

Carpenter, N. (2020) *Flash support is ending in 2020. Its legacy needs to be preserved - Polygon* [online]. Available from: https://www.polygon.com/2020/2/10/21124247/flash-support-history-of-web-1-0-flashpoint-bluemaxima (Accessed 5 November 2020).

Carr, D. F. (2013) *Udacity Hedges On Open Licensing For MOOCs* [online]. Available from: https://www.informationweek.com/software/udacity-hedges-on-open-licensing-for-moocs/d/d-id/1111226 (Accessed 8 August 2017).

Caselli, G. (1990) *Gli antichi romani*. Giunti-Marzocco.

Casilli, C. & Knight, E. (2012) *7 Things You Should Know About Badges | EDUCAUSE* [online]. Available from: https://library.educause.edu/resources/2012/6/7-things-you-should-know-about-badges (Accessed 11 November 2019).

Castoldi, M. (2013) *Curricolo per competenze: percorsi e strumenti*. Rome: Carocci editore.

Cathopedia (2017) *L'enciclopedia cattolica.* [online]. Available from: https://it.cathopedia.org/wiki/Sede_suburbicaria_di_Porto-Santa_Rufina (Accessed 7 August 2017).

Cavanagh, T. et al. (2020) Getting Started With Open Badges and Open Microcredentials. *The International Review of Research in Open and Distributed Learning*. [Online] 21 (1), 154–172.

Celsian Education (2019) *How will Brexit affect the education system in the UK?* [online]. Available from: https://www.celsianeducation.co.uk/celsian-blog/how-will-brexit-affect-the-education-system-in-the-uk (Accessed 6 June 2021).

Chandler, F. (2015) *The Usborne Encyclopedia of the Roman World: Internet-Linked (History Encyclopedias): Bingham, Jane, Chandler, Fiona, Taplin, Sam: 9780794501174: Amazon.com: Books*. Usborne Publishing.

Chastney, R. (2015) *Introducing new open, shareable steps on FutureLearn* [online]. Available from: https://www.futurelearn.com/info/blog/introducing-new-open-shareable-steps-in-futurelearn-courses (Accessed 29 March 2020).

Chastney, R. (2016) *Welcoming 3 million people to FutureLearn* [online]. Available from: https://www.futurelearn.com/info/blog/welcoming-3-million-people-to-futurelearn (Accessed 6 June 2021).

Chauhan, A. (2015) 'Beyond the Phenomenon: Assessment in Massive Open Online Courses (MOOCs).', in E., McKay & J. Lenarcic (eds.) *Macro-Level Learning through Massive Open Online Courses (MOOCs): Strategies and Predictions for the Future* . [Online]. IGI Global. pp. 119–140.

Chen, B. et al. (2020) Teachers' networked professional learning with MOOCs. *PLoS ONE*. [Online] 15 (7), e0235170. [online]. Available from: https://doi.org/10.1371/journal.pone.0235170 (Accessed 6 June 2021).

Chen, B. et al. (2020) Teachers' networked professional learning with MOOCs. *PLoS ONE*. [Online] 15 (7), e0235170. [online]. Available from: https://doi.org/10.1371/journal.pone.0235170 (Accessed 6 June 2021).

Chen, J. C.-C. (2013) 'Opportunities And Challenges of MOOCS: Perspectives From Asia', in *IFLA WLIC 2013*. 2013 Singapore: Future Libraries: Infinite Possibilities. p. [online]. Available from: http://library.ifla.org/157/1/098-chen-en.pdf (Accessed 5 May 2015).

Chen, P. Y. & Hwang, G. J. (2019) An IRS-facilitated collective issue-quest approach to enhancing students' learning achievement, self-regulation and collective efficacy in flipped classrooms. *British Journal of Educational Technology*. [Online] 50 (4), 1996–2013.

Cheverie, J. (2013) *MOOCs and Intellectual Property: Ownership and Use Rights | EDUCAUSE* [online]. Available from: https://er.educause.edu/blogs/2013/4/moocs-and-intellectual-property-ownership-and-use-rights (Accessed 6 June 2021).

Chicioreanu, T. D. et al. (2019) 'Education and Modern Technologies, their Positive and Negative Impact', in *The 15 th International Scientific Conference eLearning and Software for Education Bucharest, April 11-12, 2019*. [Online]. 2019 Bucarest: 'Carol I' National Defence University. p.

Chua, S. M. et al. (2017) 'Discussion Analytics: Identifying Conversations and Social Learners in FutureLearn MOOCs - Open Research Online', in Lorenzo Vigentini et al. (eds.) *MOOC analytics: live dashboards, post-hoc analytics and the long-term effects*. 2017 CEUR-WS.org. pp. 36–62. [online]. Available from: http://oro.open.ac.uk/57071/ (Accessed 6 June 2021).

Churches, A. (2009) *Bloom's Digital Taxonomy*.

Cinganotto, L. (2016) CLIL in Italy: A general overview. *Latin American Journal of Content & Language Integrated Learning*. [Online] 9 (2), . [online]. Available from: https://laclil.unisabana.edu.co/index.php/LACLIL/article/view/7177 (Accessed 6 June 2021).

Cinotto, S. (2018) Regionalism and Nationalism in Migrant Marketplaces: Transnational Social Geographies and the Globalization of Italian Food. *Global Food History*. [Online] 4 (1), 59–77. [online]. Available from:

https://www.tandfonline.com/doi/abs/10.1080/20549547.2018.1422353 (Accessed 6 June 2021).

Clark, D. (2013) *MOOCs: taxonomy of 8 types of MOOC* [online]. Available from: http://donaldclarkplanb.blogspot.com/2013/04/moocs-taxonomy-of-8-types-of-mooc.html (Accessed 4 June 2021).

Clark, N. (2014) *Size matters: 'Crucial' ancient Roman city Ostia was 40% bigger than previously thought, after British team uncovers new ruins | The Independent | The Independent* [online]. Available from: https://www.independent.co.uk/news/science/archaeology/size-matters-crucial-ancient-roman-city-ostia-was-40-bigger-previously-thought-after-british-team-uncovers-new-ruins-9265461.html (Accessed 6 June 2021).

Clegg, A. (1967) '"The middle school cometh". ', in A., Clegg et al. (eds.) *The middle school: a symposium*. Kettering: The Schoolmaster Publishing Co. Ltd. pp. 1–9. [online]. Available from: https://scholar.google.com/scholar_lookup?hl=en&publication_year=1967&pages=1-9&author=A.+Clegg&title=+The+middle+school%253A+a+symposium+ (Accessed 8 June 2021).

Clegg, A. (1965) '"West Riding"', in S Maclure (ed.) *Comprehensive planning*. London: Councils and Education Press. pp. 75–79. [online]. Available from: https://scholar.google.com/scholar_lookup?hl=en&publication_year=1965&pages=75-79&author=A.+Clegg&title=+Comprehensive+planning+ (Accessed 8 June 2021).

Clouder, L. & Adefila, A. (2014) The 'Gift Exchange': a metaphor for understanding the relationship between educator commitment and student effort on placement. *The Higher Education Academy*. [Online] 2 (2), 54–64.

Collettini, C. et al. (2016) *Dal museo al museo, 1979-2016* [online]. Available from: https://cirili.hypotheses.org/315 (Accessed 7 June 2017).

Collier, A. (1994) *Critical Realism: An Introduction to Roy Bhaskar's Philosophy*.

Comunicazione della Commissione Europea (2014) *Verso un approccio integrato al patrimonio culturale per l'Europa*.

Conole, G. & Martin, O. (2007) *Contemporary perspectives in e-learning research: themes, methods and impact on practice - Open Research Online*. London: Routledge.

Conrads, J. et al. (2017) *Digital Education Policies in Europe and Beyond: Key Design Principles for More Effective Policies.* . EUR 29000 EN. C. Redecker et al. (eds.). [Online]. Luxembourg: Publications Office of the European Union,.

Conway, P. (2011) Archival quality and long-term preservation: a research framework for validating the usefulness of digital surrogates. *Archival Science 2011 11:3*. [Online] 11 (3), 293–309.

Cook, A. et al. (2020) 'Learning for life in a changing world: England', in *Teacher Education in the Global Era: Perspectives and Practices*. [Online]. Springer Singapore. pp. 271–284.

Coonan, C. M. (2014) CLIL in (Language) Teacher Training. *Studi di Glottodidattica*. 21–14.

Coonan, C. M. (2005) The natural learning of a foreign language: CLIL as a possible partial solution for the primary school. *Scuola e Lingue Moderne*. 4 (5), 4–11.

Coonan, C. M. (2015) 'How are students engaged in subject learning through the LS? The case of secondary schools in Italy', in *Diverse Contexts – Converging Goals*. [Online]. Peter Lang D. pp. 153–169.

Coonan, C. M. (2014) Le basi glottodidattiche del CLIL. *La ricerca*. 617–20.

Coonan, C. M. (2012) The Foreign Language Curriculum and CLIL. *Synergies Italie*. 8117–128.

Coonan, C. M. (2007) Insider views of the CLIL class through teacher self-observation-introspection. *International Journal of Bilingual Education and Bilingualism*. [Online] 10 (5), 625–646.

Corbishley, M. (1999) 'The National Curriculum: help or hindrance to the introduction of archaeology in schools?', in J. Beavis & A. Hunt (eds.) *Communicating Archaeology*. . Oxford: Oxbow Books. pp. 71–80.

Corino, E. (2019) Data-driven Learning: la linguistica dei corpora al servizio della didattica delle lingue straniere e del CLIL. *EL.LE*. [Online] 8 (2), .

Cornelius, S. et al. (2019) Understanding learner engagement on a blended course including a MOOC. *Research in Learning Technology*. [Online] 27. [online]. Available from: http://dx.doi.org/10.25304/rlt.v27.2097 (Accessed 8 June 2021).

Costantini, V. (2017) *Corriere Roma: le ultime news dal Lazio* [online]. Available from: https://roma.corriere.it/notizie/arte_e_cultura/17_maggio_30/fiumicino-archeologia-aeroporto-mostra-apollo-afrodite-tevere-8367b8f2-4545-11e7-81bc-6e91411407c5.shtm (Accessed 21 August 2017).

Council for British Archaeology (1989) *Archaeology for Ages 5-16*. London: Council for British Archaeology.

Coursera (2016) *Coursera's transition to a new technology platform - Coursera Blog* [online]. Available from: https://blog.coursera.org/courseras-transition-to-a-new-technology-platform/ (Accessed 10 April 2021).

Couto, M. J. et al. (2018) 'DIGITAL LITERACY IN EUROPE: BEST PRACTICES IN SIX COUNTRIES', in *EDULEARN18 Conference 2-4 July 2018*. 2018 Palma, Mallorca, Spain. pp. 3530–3538.

Coyle, D. et al. (2010) *Content and Language Integrated Learning*. Cambridge, United Kingdom: Cambridge University Press.

Crick, B. (2000) *Essays on Citizenship*. London: Continuum.

Cross, J. S. et al. (2019) 'Improving MOOC quality using learning analytics and tools', in *Proceedings of 2019 IEEE Learning With MOOCS, LWMOOCS 2019*. [Online]. 1 October 2019 Institute of Electrical and Electronics Engineers Inc. pp. 174–179.

Crowder, N. (1959) 'Automatic tutoring by means of intrinsic programming.', in E. H. Galante (ed.) *Automatic teaching: the state of the art*. [Online]. New York: Wiley. pp. 109–116.

Da Milano, C. (2009) 'Il ruolo delle politiche culturali nella lotta all'esclusione sociale in Europa e in Italia', in A. M. Pecci (ed.) *Patrimoni in migrazione. Accessibilità, partecipazione, mediazione interculturale nei musei, Milano, Franco Angeli*. Milano: Franco Angeli . p. [online].

Da Milano, C. & Sciacchitano, E. (2015) *Linee Guida per la comunicazione nei musei: segnaletica interna, didascalie e pannelli.* QUADERNI DELLA VALORIZZAZIONE - NS 1.

Dalton-Puffer, C. (2011) Content-and-language integrated learning: From practice to principles? Annual Review of Applied Linguistics 31 p.182–204. [online]. Available from: https://www.cambridge.org/core/journals/annual-review-of-applied-

linguistics/article/abs/contentandlanguage-integrated-learning-from-practice-to-principles/E16B42F2B04D6D8B9A12617D6CFE58A4 (Accessed 6 June 2021).

Daniel, J. (2012) Making Sense of MOOCs: Musings in a Maze of Myth, Paradox and Possibility. *Journal of Interactive Media in Education*. [Online] 2012 (3), 18. [online]. Available from: http://jime.open.ac.uk/articles/10.5334/2012-18/ (Accessed 6 June 2021).

Dappert, A. et al. (2016) *Digital Preservation Metadata for Practitioners*. [Online]. Springer International Publishing.

Davies, R. et al. (2015) Using Open Badges to Certify Practicing Evaluators: *http://dx.doi.org/10.1177/1098214014565505*. [Online] 36 (2), 151–163.

Davis, C. (2013) Flipped or inverted learning: Strategies for course design. *Enhancing Instruction with Visual Media: Utilizing Video and Lecture Capture*. [Online] 241–263.

Daynes, K. (2007) *See Inside Ancient Rome* . Usborne Children's books.

De Fiori, A. & Lazzari, M. (2013) 'L'uso degli strumenti telematici fra gli adolescenti della scuola secondaria di primo grado', in M. Lazzari & M. Jacono Quarantino (eds.) *Identità, fragilità e aspettative nelle reti sociali degli adolescenti*. Bergamo: Sestante edizioni. pp. 205–226.

De Graaff, R. et al. (2007) An observation tool for effective L2 pedagogy in Content and Language Integrated Learning (CLIL). *International Journal of Bilingual Education and Bilingualism*. [Online] 10 (5), 603–624. [online]. Available from: https://www.tandfonline.com/action/journalInformation?journalCode=rbeb20 (Accessed 8 June 2021).

De Mauro, T. (2007) *Guida all'uso delle parole.* . 3 Edition. Roma: Editori Riuniti. [online]. Available from: https://editoririuniti.it/products/guida-alluso-delle-parole-parlare-e-scrivere-semplice-e-preciso-per-capire-e-farsi-capire (Accessed 1 April 2021).

De Mauro, T. (2009) *Storia linguistica dell'Italia unita*. Roma: Laterza.

De Meo, A. (2015) *From CLIL to ESP: the teacher's perspective - Google Books*. Napoli: Il Torcoliere.

De Pietro, O. (2019) Service Learning e Alternanza Scuola Lavoro: un possibile raccordo per maturare le Soft Skills richieste dal mondo del lavoro. Una indagine esplorativa. . *Italian Journal of Educational Research*. 22157–178.

De Pietro, O. (2013) Authentic and Situated Learning with the Use of an Adaptive Search Engine and a QR-Code in Mobile Mode. *International Journal of Digital Literacy and Digital Competence*. 4 (3), .

Dei, M. (2012) *La scuola in Italia*. Bologna: Il Mulino. [online]. Available from: https://www.mulino.it/isbn/9788815237828 (Accessed 8 June 2021).

Dell'Unto, N. et al. (2017) 4D recording at the trowel's edge: Using three-dimensional simulation platforms to support field interpretation. *Journal of Archaeological Science: Reports*. [Online] 12632–645.

Dell'Unto, N. (2018) 3D models and knowledge production. *Archaeology and Archaeological Information in the Digital Society*. [Online] 54–69.

Denard, H. (2011) 'A New Introduction to the London Charter', in *Paradata and Transparency in Virtual Heritage*. [Online]. Routledge. pp. 83–98.

Denscombe, M. (2014) *The Good Research Guide. For small-scale social research projects(5th edition)*.

Denti, M. (1999) *La Roma imperiale: siti e avvenimenti di rilievo e attività degli abitanti in una ricostruzione sotto forma di guida. - Serie Tu Turista nel passato.* . Istituto Geografico De Agostini.

Denzin, N. (1989) *Interpretive interactionism*. Newbury Park, CA: Sage.

Department for Digital Culture Media and Sports (2018) *Thanking Part Survey: England Adult Report, 2017/18*.

Department for Education (2015) *Careers Guidance and Inspiration in Schools: Statutory guidance for governing bodies, school leaders and school staff*.

Department for Education (2015) *Post-16 work experience as a part of 16 to 19 study programmes and traineeships: Departmental advice for post-16 education and training providers*.

Department of Education (2014) *MOOCs: Opportunities for their use in compulsory-age education*.

Department of Education and Science (1965) *DES Circular 10/65 (1965) - The organisation of secondary education*.

Derudas, P. et al. (2018) 'A 3D Digital Approach for the Study and Presentation of the Bisarcio Site.', in M. Matsumoto & E. Uleberg (eds.) *CAA2016 : Oceans of Data. Proceedings of the 44th Conference on Computer Applications and Quantitative Methods in Archaeology*. 2018 Oxford: Archaeopress. pp. 389–398.

Dewey, J. (1997) *Experience and education*. New York: Touchstone.

Di Domenicantonio, L. (2008) *Portus*. Milano: Andromeda Editrice.

Di Marcantonio, G. (2015) *Descrivere o Comunicare? Il web 3.0 e la restituzione delle informazioni culturali.* Università di Macerata.

Dickie, J. (2018) *Delizia! : the epic history of the Italians and their food* . J. Dickie (ed.). New York: Simon and Schuster.

Digital Curation Centre (2020) *About DCC* [online]. Available from: https://www.dcc.ac.uk/about (Accessed 5 January 2021).

Digital Preservation Coalition (2015) *Digital Preservation Handbook*. [online]. Available from: https://www.dpconline.org/handbook (Accessed 4 November 2020).

Dochy, F. et al. (1999) The Use of Self-, Peer and Co-assessment in Higher Education: A review. *Studies in Higher Education*. [Online] 24 (3), 331–350.

Downes, S. (2010) *Fairness and Equity in Education | HuffPost* [online]. Available from: https://www.huffpost.com/entry/democratizing-education_b_794925 (Accessed 4 June 2021).

Downes, S. (2011) *Connectivism and Connective Knowledge* [online]. Available from: https://www.downes.ca/post/54540 (Accessed 7 April 2020).

Downes, S. (2006) *Learning Networks and Connective Knowledge*. Instructional Technology Forum.

Doyle, J. et al. (2009) Long-term digital preservation: preserving authenticity and usability of 3-D data. *International Journal on Digital Libraries 2009 10:1*. [Online] 10 (1), 33–47. [online]. Available from: https://link.springer.com/article/10.1007/s00799-009-0051-7 (Accessed 5 November 2015).

Dyjur, P. & Lindstrom, G. (2017) Perceptions and Uses of Digital Badges for Professional Learning Development in Higher Education. *TechTrends*. [Online] 61 (4), 386–392. [online]. Available from: https://link.springer.com/article/10.1007/s11528-017-0168-2 (Accessed 11 November 2020).

Earl, G. (2015) *FutureLearn social network: Portus in the UoS MOOCosphere - Archaeology Blogs* [online]. Available from: https://generic.wordpress.soton.ac.uk/archaeology/2015/03/09/futurelearn-social-network-portus-in-the-uos-moocosphere/ (Accessed 7 April 2020).

Earl, G. (2014) *My Archaeologist is an App* [online]. Available from: http://moocs.southampton.ac.uk/portus/2014/03/04/archaeologist-app/ (Accessed 8 June 2021).

Earl, G. (2014) *Italian language on the MOOC* [online]. Available from: http://moocs.southampton.ac.uk/portus/2014/03/11/italian-language-mooc/ (Accessed 21 August 2017).

Earl, G. (2013) Modeling in Archaeology: Computer Graphic and other Digital Pasts. *Perspectives on Science*. [Online] 21 (2), 226–244.

El Shoubashy, H. et al. (2020) What is Gamification? Literature Review of Previous Studies on Gamification. *Australian Journal of Basic and Applied Sciences*. [Online] 29–51.

Elliott, T. & Gillies, S. (2009) Digital Geography and Classics . *Digital Humanities Quarterly*. 3 (1), .

European Commission (2013) *Special Eurobarometer 399: Cultural access and participation - Data Europa EU*. Directorate-General for Communication. [online]. Available from: https://data.europa.eu/data/datasets/s1115_79_2_399?locale=en (Accessed 8 June 2021).

European Commission (2017) *Special Eurobarometer 466 (2017). Cultural Heritage.* . Directorate-General for Communication. [online]. Available from: https://data.europa.eu/en (Accessed 8 June 2021).

European Parliament and European Council ((2008) Recommendation of the European Parliament and of the Council of 23 April 2008 on the Establishment of the European Qualifications Framework for Lifelong Learning. *Official Journal of the European Union*. 111–117. [online]. Available from: https://eur-

lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%253A32008H0506%252801%2529 (Accessed 8 June 2021).

European Working Group (2012) *Policies and good practices in the public arts and in cultural institutions to promote better access to and wider participation in culture.* . European Commission.

Eurydice (2017) *The structure of the European education systems 2016/17* . Brussels, Belgium: European commission. [online]. Available from: https://op.europa.eu/en/publication-detail/-/publication/becafa9c-9a85-11e6-9bca-01aa75ed71a1 (Accessed 8 June 2021).

Eurydice (2006) *Content and Language Integrated Learning (CLIL) at school in Europe* . Brussel: European Commission.

Evans, B. J. et al. (2016) Persistence patterns in massive open online courses (MOOCs). *Journal of Higher Education*. [Online] 87 (2), 206–242.

Evans, T. L. (Thomas L. & Daly, P. T. (2006) *Digital archaeology : bridging method and theory*. Abingdon, OX: Routledge.

Fabbri, L. (2007) *Comunità di pratiche e apprendimento riflessivo. Per una formazione situata.* . Roma: Carocci editore .

Fabbri, L. et al. (2015) Apprendere dai contesti di pratica situata: modelli didattici innovativi nell'alternanza scuola-lavoro. *EDUCATIONAL REFLECTIVE PRACTICES*. [Online] 5 (1), 65–77.

Fargo, H. et al. (2020) Writing for the public. *The Information Society*. [Online] 36 (2), 124–129.

Fazzi, F. & Lasagabaster, D. (2021) Learning beyond the classroom: students' attitudes towards the integration of CLIL and museum-based pedagogies. *Innovation in Language Learning and Teaching*. [Online] 15 (2), 156–168.

Feinstein, O. N. (1998) Realistic Evaluation. Evaluation 4 (2) p.243–246.

Ferguson, B. (2009) *Ancient theatre is uncovered in Rome. Independent, 30 September 2009.* [online]. Available from: http://www.independent.co.uk/arts-entertainment/architecture/ancient-theatre-is-uncovered-in-rome-1795799.html (Accessed 21 August 2017).

Ferguson, R. et al. (2019) *Educational visions: The lessons from 40 years of innovation*. [Online]. Ubiquity Press.

Fieber, K. D. et al. (2017) Cultural heritage through time: a case study at Hadrian's Wall, United Kingdom. *International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences*. [Online] XLII–2 (W3), 397–302.

Fieber, K. D. et al. (2017) Cultural Heritage Through Time: a case study at Hadrian's Wall, United Kingdom. *International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences 2017*. [Online] XLII-2/W3297–302. [online]. Available from: https://doi.org/10.5194/isprs-archives-XLII-2-W3-297-2017 (Accessed 29 May 2021).

Field, K. (2016) *Secondary School Running an Exchange Programme? | by Kevin Field | digitalme | Medium* [online]. Available from: https://medium.com/digitalme-an-open-badge-adventure/secondary-school-running-an-exchange-programme-badge-it-with-go2b-902533424209 (Accessed 8 June 2021).

Fielding, S. et al. (2019) Exploring our oceans: Using the global classroom to develop ocean literacy. *Frontiers in Marine Science*. [Online] 6 (JUN), 25.

Fitzcarraldo (2006) *IO NON VADO AL MUSEO! Esplorazione del non pubblico degli adolescenti SINTESI DELLE PRINCIPALI EVIDENZE*.

Flavin, M. (2016) Technology-enhanced learning and higher education. *Oxford Review of Economic Policy*. [Online] 32 (4), 632–645.

Forte, M. (1993) 'Image Processing Applications in Archaeology: Classification Systems of Archaeological Sites in the Landscape ', in J. Andresen et al. (eds.) *Computing the Past. Computer Applications and Quantitative Methods in Archaeology. CAA92.* . 1993 Aarhus: Aarhus University Press. pp. 53–62.

Francomputer (2008) 'Sociologia: Analfabetismo - Italia', in *Fino al 2001 e Ritorno. Libro-Agenda.* p. [online]. Available from: https://www.cronologia.it/analfa1.htm (Accessed 21 August 2017).

Fredheim, L. H. (2020) Decoupling 'Open' and 'Ethical' Archaeologies: Rethinking Deficits and Expertise for Ethical Public Participation in Archaeology and Heritage. *Norwegian Archaeological Review*. [Online] 53 (1), 5–22. [online]. Available from: https://www.tandfonline.com/action/journalInformation?journalCode=sarc20 (Accessed 8 June 2021).

Frischer, B. (2008) 'From digital illustration to digital heuristics', in B. Frischer & A. Dakouri-Hild (eds.) *Beyond illustration: 2D and 3D technologies as tools for discovery in archaeology*. pp. v–xxiv. [online]. Available from: https://www.academia.edu/36445363/From_digital_illustration_to_digital_heuristics (Accessed 7 June 2021).

Fulloni, A. (2011) *Allarme crolli al Porto di Traiano: fondi limitati e turisti contingentati - Corriere Roma* [online]. Available from: https://roma.corriere.it/roma/notizie/cronaca/11_febbraio_6/porto-traiano-problemi-gestione-fulloni-181409037787.shtml (Accessed 21 August 2017).

FutureLearn (2018) *FutureLearn and Non-English languages* [online]. Available from: https://futurelearn.zendesk.com/hc/en-us/articles/115008456388-FutureLearn-and-Non-English-languages (Accessed 1 April 2020).

Galindo-Dominguez, H. (2021) International Forum of Educational Technology & Society Flipped Classroom in the Educational System. *Technology & Society*. [Online] 24 (3), 44–60.

Galindo-Domínguez, H. (2019) Influence of flipped classroom methodology on the self-concept of primary education students. *Aloma: Revista de Psicologia, Ciències de l'Educació i de l'Esport*. [Online] 37 (2), 35–42.

Gameel, B. G. & Wilkins, K. G. (2019) When it comes to MOOCs, where you are from makes a difference. *Computers and Education*. [Online] 13649–60.

García-Hernández, M. et al. (2017) Cultural heritage and urban tourism: Historic city centres under pressure. *Sustainability (Switzerland)*. [Online] 9 (8), 1346. [online]. Available from: www.mdpi.com/journal/sustainability (Accessed 7 June 2021).

García-Peñalvo, F. J. et al. (2018) An adaptive hybrid MOOC model: Disrupting the MOOC concept in higher education. *Telematics and Informatics*. [Online] 35 (4), 1018–1030.

Garrison, D. R. et al. (2010) The first decade of the community of inquiry framework: A retrospective. *Internet and Higher Education*. [Online] 13 (1–2), 5–9.

Gauthier, T. (2020) The value of microcredentials: The employer's perspective. *The Journal of Competency-Based Education*. [Online] 5 (2), e01209.

Gelernter, J. & Lesk, M. (2011) Use of Ontologies for Data Integration and Curation. *International Journal of Digital Curation*. [Online] 6 (1), 70–78.

Genovesi, G. (2010) *Storia della scuola in Italia dal Settecento a oggi*. Laterza (ed.).

George, G. et al. (2020) Digital Sustainability and Entrepreneurship: How Digital Innovations Are Helping Tackle Climate Change and Sustainable Development: *https://doi.org/10.1177/1042258719899425*. [Online] 45 (5), 999–1027.

Gerbner, G. (1987) SCIENCE ON TELEVISION: How It Affects Public Conceptions. *Issues in Science and Technology*. 3 (3), 109–115. [online]. Available from: https://www.jstor.org/stable/43309074?seq=1#metadata_info_tab_contents (Accessed 8 June 2020).

Giannini, F. (2019) *I diciottenni non vanno al museo? Il costo non c'entra: semplicemente, non lo ritengono interessante | Finestre sell'Arte* [online]. Available from: https://www.finestresullarte.info/opinioni/giovani-non-vanno-al-museo-perche-non-interessa (Accessed 11 November 2020).

Gibbons, G. (2012) *Visualisation in Archaeology Project: Final report.*

Gibbons, G. et al. (2014) *Assessing the Visual Representation of Data in Archaeology:*

Gibbons, G. (2010) Visualisation in Archaeology: Connecting Research and Practice. *Virtual Archaeology Review*. [Online] 1 (2), 13.

Gibbs, K. et al. (2007) *Musei e apprendimento lungo tutto l'arco della vita. Un manuale europeo*. Ferrara: EDISAI 2007.

Gibbs, M. & Colley, S. (2012) Digital Preservation,: Online access and historical archaeology 'grey literature' from New South Wales, Australia. *Australian Archaeology*. [Online] 75 (1), 95–103.

Glaser, R. (1963) Instructional technology and the measurement of learing outcomes: Some questions. *American Psychologist*. [Online] 18 (8), 519–521.

Glennie, J. et al. (2012) *Open Educational Resources and Change in Higher Education: Reflections From Practice*. Vancouver BC/Paris: Commonwealth of Learning/UNESCO. [online]. Available from: https://teachonline.ca/tools-trends/must-read-books-on-online-learning/open-educational-resources-and-change-higher-education-reflections-practice (Accessed 8 June 2021).

Gómez-Estern, B. M. et al. (2015) "Real Learning" in Service Learning: Lessons from La Clase Mágica in the US and Spain. *International Journal for Research on Extended Education*. [Online] 2 (2), 63–78.

Gonzales, A. et al. (2019) MetroTeach: Modelling of knowledge and skills in a MOOC with the visuo-cognitive metaphor of the metro map. *Education for Information*. [Online] 35 (3), 285–304.

Goodyear, P. et al. (2004) 'Research on networked learning: An overview', in *Advances in Research on Networked Learning*. [Online]. Springer Netherlands. pp. 1–9.

Gordon, D. G. & Wiltrout, M. E. (2021) A Framework for Applying the Learning Sciences to MOOC Design. *Frontiers in Education*. [Online] 5301.

Gracy, K. F. & Kahn, M. B. (2012) Preservation in the Digital Age. *Library Resources & Technical Services*. [Online] 56 (1), 25–43.

Graddol, D. (2006) *English Next. Why global English may mean the end of English as a Foreign Language*.

Gradini, A. (2015) *Legislazione Scolastica* . Rimini: Maggioli Editore. [online]. Available from: https://www.hoepli.it/libro/legislazione-scolastica/9788891611437.html (Accessed 8 June 2021).

Graham, D. & Tyler, D. A. (1992) *A Lesson for Us All : the making of the national curriculum.* New York: Routledge.

Grande, A. & Lopez-Menchero, V. M. (2011) The implementation of an International Charter in the field of Virtual Archaeology. Presented at the CIPA symposium 2011 p.1–5. [online]. Available from: https://www.academia.edu/20124021/The_implementation_of_an_International_Charter_in_the_field_of_Virtual_Archaeology (Accessed 8 June 2021).

Grantham, N. (2014) *Bloom's Taxonomy for the Digital World* [online]. Available from: https://www.fractuslearning.com/blooms-taxonomy-digital-print-table/ (Accessed 21 August 2017).

Grassi, G. B. (1901) 'Studi di uno zoologo sulla malaria ', in *Atti dei Linncei*. Roma: R. Accademia dei lincei. pp. 299–516.

Grassi, G. B. (1899) *Ancora sulla malaria.* . Vol. 8. R. C. Accad. Lincei .

Grassi, G. B. (1898) Rapporti tra la malaria e peculiari insetti (zanzaroni e zanzare palustri). *R. C. Accad. Lincei*. 7163–177.

Grassi, G. B. et al. (1899) *Resoconto degli studi fatti sulla malaria durante il mese di gennaio. .* Vol. 8. Roma: R. C. Accad. Lincei.

Grasso, A. (2014) *Se anche Manzi diventa un santino.* [online]. Available from: www.corriere.it/spettacoli/14_febbraio_26/se-anche-manzi-diventa-santino-e6397aa8-9eb1-11e3-a5c9-783ac0edee3c.shtml (Accessed 17 February 2017).

Grendler, P. F. (1991) *La scuola nel Rinascimento italiano*. Roma-Bari: Laterza.

Grima, R. (2016) But Isn't All Archaeology 'Public' Archaeology? *Public Archaeology*. [Online] 15 (1), 50–58. [online]. Available from: https://doi.org/10.1080/14655187.2016.1200350 (Accessed 8 June 2021).

Guo, P. J. & Reinecke, K. (2014) 'Demographic differences in how students navigate through MOOCs', in *L@S 2014 - Proceedings of the 1st ACM Conference on Learning at Scale*. [Online]. 2014 Association for Computing Machinery. pp. 21–30.

Hackman, L. J. (2011) *Many happy returns : advocacy and the development of archives*. Society of American Archivists.

Hadi, S. M. (2016) *What does the future hold for MOOCs?- University Business* [online]. Available from: https://universitybusiness.co.uk/news/ask-the-expert-what-does-the-future-hold-for-moocs/ (Accessed 8 August 2017).

Hannon, J. et al. (2007) Cultural Diversity Online: Student Engagement with Learning Technologies. *International Journal of Educational Management*. 21 (5), 418–432.

Hardesty, J. L. et al. (2020) 3d data repository features, best practices, and implications for preservation models: Findings from a national forum. *College and Research Libraries*. [Online] 81 (5), 789–807.

Hare, S. & Sullivan, M. (2020) A qualitative study on the digital preservation of OER. *Libraries and the Academy*. [Online] 20 (4), 749–773.

Haron, H. et al. (2019) MOOC Initiative: A Technology Enhanced Learning in 21 Century at Higher Learning Institution. *Journal of Information System and Technology Management*. [Online] 4 (14), 26–33.

Harrison, M. et al. (2013) 'Grammar Modelling and the Visualization of an Uncertain Past : The Case of Building V at Portus', in G. Earl et al. (eds.) *Archaeology in the Digital Era. Papers from the 40th Annual Conference of Computer Applications*

and *Quantitative Methods in Archaeology (CAA), Southampton, 26-29 March 2012.* 2013 Amsterdam University Press; University of Chicago Press. p.

Harrison, R. (2010) '"What is Heritage?"', in Harrison Rodney (ed.) *Understanding the politics of heritage* . Manchester: Manchester University Press. pp. 5–42. [online]. Available from: https://www.worldcat.org/title/understanding-the-politics-of-heritage/oclc/764464063 (Accessed 8 June 2021).

Hart, M. (2015) *Badges: A New Measure of Professional Development |Campus Technology* [online]. Available from: https://campustechnology.com/Articles/2015/01/14/Badges-A-New-Measure-of-Professional-Development.aspx?Page=2 (Accessed 11 November 2020).

Haski-Leventhal, D. (2020) The Way Forward in Higher Education. *The Purpose-Driven University*. [Online] 133–145.

Haynes, I. (2017) Visualisation, Provocation and Open Scholarship - YouTube. Open Digital Heritage Scholarship workshop, 24-28 June 2017 [online]. Available from: https://www.youtube.com/watch?v=OyrGbAGly5s&list=PLyqg6Ek4UX46qR3SIqTCJaAETGsrLopCB&index=14 (Accessed 7 June 2021).

Healey, N. (2013) Is UK Transnational Education 'One of Britain's Great Growth Industries of the Future?' *Higher Education Review*. 45 (3), 3–35.

Heer, R. (2013) *A Model of Learning Objectives*. [online]. Available from: https://www.celt.iastate.edu/wp-content/uploads/2015/09/RevisedBloomsHandout-1.pdf (Accessed 8 August 2017).

Hendriks, R. A. et al. (2020) Instructional design quality in medical Massive Open Online Courses for integration into campus education. *Medical Teacher*. [Online] 42 (2), 156–163.

Hennah, N. (2018) Open badges Part 1: what, why, how? *School Science Review*. 100 (371), 76–80. [online]. Available from: https://openbadges.org/community/ (Accessed 8 August 2020).

Henson, D. (2016) 'Archaeology and education in the UK. ', in G. Moshenska (ed.) *Key Concepts in Public Archaeology*. London: UCL press. p. [online]. Available from: -8 (Accessed 8 June 2021).

Henson, D. (2008) History and Archaeology at 16-16 in the United Kingdom. . *Research in Archaeological education journal*. 1 (1), 60–65.

Hermon, S. et al. (2007) 'The London charter and its applicability', in *VAST: International Symposium on Virtual Reality, Archaeology and Intelligent Cultural Heritage, Nov. 2007.* 2007 Brishton: Archaeolingua. pp. 11–14. [online]. Available from: https://www.worldcat.org/title/vast-2007-the-8th-international-symposium-on-virtual-reality-archaeology-and-intelligent-cultural-heritage-5th-eurographics-workshop-on-graphics-and-cultural-heritage-brighton-uk-november-26-30-2007/oclc/179803508 (Accessed 8 October 2020).

Hermon, S. (2008) 'Reasoning in 3D: a Critical appraisal of the role of 3D modeling and Virtual Reconstructions in archaeology', in B., Frischer & A. Dakouri-Hild (eds.) *Beyond Illustration: 2d and 3d Digital Technologies as Tools for Doscovery in Archaeology*. BAR. pp. 36–45.

Highman, L. (2019) Future EU-UK research and higher education cooperation at risk: what is at stake? *Tertiary Education and Management*. [Online] 25 (1), 45–52.

Holter, I. M. & Schwartz-Barcott, D. (1993) Action research: what is it? How has it been used and how can it be used in nursing? *Journal of Advanced Nursing*. [Online] 18 (2), 298–304.

Holtorf, C. (2006) *Archaeology is a Brand!: the meaning of Archaeology in Contemporary Popular Culture*. London: Archaeopress. [online]. Available from: https://www.routledge.com/Archaeology-Is-a-Brand-The-Meaning-of-Archaeology-in-Contemporary-Popular/Holtorf/p/book/9781598741797 (Accessed 8 June 2021).

Holtorf, C. (2007) Can you hear me at the back? Archaeology, communication and society. European Journal of Archaeology 10 (2–3) p.149–165.

Hornby, A. S. & Cowie, A. P. (1995) *Oxford Advanced Learner's Dictionary* . Vol. 1430. Oxford : Oxford university press. [online]. Available from: https://www.bookdepository.com/Oxford-Advanced-Learners-Dictionary-S-Hornby/9780194311670 (Accessed 8 June 2021).

Horne, R. (2020) Beyond lists: digital gazetteers and digital history. *Historian*. [Online] 82 (1), 37–50.

Houston, W. (2013) *Online college courses: Outsourcing education - The Economist* [online]. Available from: https://www.economist.com/blogs/democracyinamerica/2013/05/online- college-courses (Accessed 20 September 2017).

Hsieh, H. F. & Shannon, S. E. (2005) Three approaches to qualitative content analysis. *Qualitative Health Research*. [Online] 15 (9), 1277–1288.

Hu, H. et al. (2019) 'Internationalisation of England Independent Schools', in *Proceedings of International Academic Conferences 9610765,*. 2019 International Institute of Social and Economic Sciences. p. [online]. Available from: https://ideas.repec.org/p/sek/iacpro/9610765.html.

Hudgins, A. (2011) Preservation of the Video Game . *Provenance: The Journal of the Society of Georgia Archivists*. 29 (1), 31–48. [online]. Available from: https://silo.tips/download/preservation-of-the-video-game (Accessed 5 November 2020).

Iannis, G. et al. (2016) Career Management Skills: progettare la valenza orientativa dell'alternanza scuola lavoro. The role of CMS (Career Management Skills) within the work based learning strategy. *Lifelong Lifewide Learning*. 12 (28), 20–32.

Ilieva, J. et al. (2017) *The Shape of Global Higher Education: International Mobility of Students and Education Provision*.

Impiglia, C. (2016) *Il Principe Giovanni Torlonia e la Rinascita Dell'Agro Romano. Architetture e Paesaggi d'Acque nella Tenuta di Porto a Fiumicino. *.

Infelise, L. & Franceschi, L. (2016) *Open Badge Network Discussion Paper on Open Badges for Individuals*.

Infelise, L. & Franceschi, L. (2017) *Discussion Paper on Open Badges for Individuals (O3A1)*.

Isaksen, L. et al. (2014) 'Pelagios and the emerging graph of ancient world data', in *WebSci 2014 - Proceedings of the 2014 ACM Web Science Conference*. [Online]. 2014 Association for Computing Machinery. pp. 197–201.

ISTAT (2019) *L'Italia dei musei*.

ISTAT (2006) *I cittadini e il tempo libero. Indagine multiscopo sulle famiglie italiane,*.

ISTAT-FUB (2018) *Internet@Italia 2018 Domanda e offerta di servizi online e scenari di digitalizzazione*.

Jenner, M. (2018) *Are learners learning? (and how do we know?) - FutureLearn* [online]. Available from: https://www.futurelearn.com/info/press/research-insights/learners-learning-know (Accessed 10 May 2020).

Jensen, P. (2018) Semantically Enhanced 3D: A Web-based Platform for Spatial Integration of Excavation Documentation at Alken Enge, Denmark. *https://doi.org/10.1080/00934690.2018.1510299*. [Online] 43 (sup1), S31–S44.

Jerome, L. (2012) Service learning and active citizenship education in England. *Education, Citizenship and Social Justice*. [Online] 7 (1), 59–70. [online]. Available from: https://journals.sagepub.com/doi/10.1177/1746197911432594 (Accessed 8 June 2021).

Johnson, L. et al. (2016) *NMC Horizon Report: 2016 Higher Education Edition*.

Jones, C. et al. (2015) 'Networked Learning', in *Encyclopedia of Educational Philosophy and Theory*. [Online]. Singapore: Springer Singapore. pp. 1–6. [online]. Available from: http://link.springer.com/10.1007/978-981-287-532-7_129-1 (Accessed 8 June 2021).

Kane, S. (2003) *The politics of archaeology and identity in a global context (Book, 2003) [WorldCat.org]*. Boston : Archaeological Institute of America.

Kaplan, A. M. & Haenlein, M. (2016) Higher education and the digital revolution: About MOOCs, SPOCs, social media, and the Cookie Monster. *Business Horizons*. [Online] 59 (4), 441–450.

Keay, S. et al. (2005) *Portus. An archaeological survey of the port of Imperial Rome.British School at Rome Archaeological Monographs 15.* Vol. 61. [Online]. London: The British School at Rome.

Keay, S. & Paroli, L. (2011) *Portus and its Hinterland: Recent Archaeological Research Archaeological Monographs of the British School at Rome 18*. London: The British School at Rome.

Keay, S. & Pasquinucci, M. (2013) 'The hinterland of Portus and Ostia', in *Porti Antichi e Retroterra Produttivi. Congresso Internazionale. Livorno 2009.* p.

Keay, S. (2012) *Portus and the Mediterranean. Archaeological Monographs of the British School at Rome*. Vol. 21. London: British School at Rome.

Kelly, K. (2010) CLIL in Natural Science Subjects: language and task. *Ikastaria*. (17), 91–108.

Kennedy, M. (2009) *Rome's lost world of luxury goods | Archaeology | The Guardian*
[online]. Available from: https://www.theguardian.com/science/2009/oct/01/rome-
portus-archaeological-find (Accessed 21 August 2017).

Kennedy, R. G. (2002) 'The value of archaeology', in Barbara J. Little (ed.) *Public
benefits of archaeology*. University Press of Florida. pp. XII–VX.

Khawaja, M. A. et al. (2010) 'Using Language Complexity to Measure Cognitive Load
for Adaptive Interaction Design', in *Proceedings of the 15th international
conference on Intelligent user interfaces* . 7 February 2010 Hong Kong, China: .
pp. 333–336.

King, T. (2013) *Archaeologists uncover secrets of Portus, once gateway to Rome*
[online]. Available from:
https://www.theguardian.com/world/2013/nov/12/archaeologists-secrets-portus-
roman-empire-rome (Accessed 21 August 2017).

Kivunja, C. (2013) Embedding Digital Pedagogy in Pre-Service Higher Education to
Better Prepare Teachers for the Digital Generation,. *International Journal of
Higher Education*. 2 (4), 131–142.

Kobiałka, D. (2014) Archaeology and communication with the public: archaeological
open-air museums and historical re-enactment in action. *European Journal of
Post-Classical Archaeologies* . (4), 315–332.

Kolowich, S. (2013) American Council on Education Recommends 5 MOOCs for
Credit. *The Chronicle of Higher Education*. 59 (23), .

Konnikova, M. (2014) *Will MOOCs be flukes?* [online]. Available from:
https://www.newyorker.com/science/maria-konnikova/moocs-failure-solutions
(Accessed 4 October 2019).

Konstantelos, L. & Hughes, L. (2019) *Digital Sustainability Review of HLF-Funded
Projects*. [online]. Available from: https://core.ac.uk/download/pdf/305111869.pdf
(Accessed 21 March 2021).

Kontopoulos, E. et al. (2016) 'Ontology-based Representation of Context of Use in
Digital Preservation', in A. Adamou et al. (eds.) *CEUR Workshop Proceedings
- 1st Workshop on Humanities in the Semantic Web - WHiSe, co-located with the
13th Extended Semantic Web Conference (ESWC 2016)*. 2016 Heraklion, Crete,
Greece: . pp. 65–72.

Kulik, C. L. C. et al. (1990) Effectiveness of Mastery Learning Programs: A Meta-Analysis. *Review of Educational Research*. [Online] 60 (2), 265–299.

Kumar, M. (2020) Future prospects of MOOCs. . *Studies in Indian Place Names,*. 33 (40), 183–184.

Kumarasinghe, P. J. & Udeshika, K. A. A. (2015) Extra-Curricular Activities and Employability of Undergraduates in Sri Lanka. *SSRN Electronic Journal*. [Online]

Låg, T. & Sæle, R. G. (2019) Does the Flipped Classroom Improve Student Learning and Satisfaction? A Systematic Review and Meta-Analysis: *https://doi.org/10.1177/2332858419870489*. [Online] 5 (3).

Lage, M. J. et al. (2000) Inverting the classroom: A gateway to creating an inclusive learning environment. *Journal of Economic Education*. [Online] 31 (1), 30–43.

Lambert, S. P. (2019) Public engagement and education: developing and fostering stewardship for an archaeological future. *Heritage & Society*. [Online] 12 (1), 78–81.

Lasagabaster, D. & Sierra, J. M. (2009) Language Attitudes in CLIL and Traditional EFL Classes. *International CLIL Research Journal*. 1 (2), 4–17.

Laurillard, D. (2012) *Teaching as a Design Science: Building Pedagogical Patterns for Learning*.

Laurillard, D. (2013) *Rethinking university teaching: A conversational framework for the effective use of learning technologies*. [Online]. Taylor and Francis.

Lave, J. (1988) *Cognition in Practice*. [Online]. Cambridge University Press.

Lave, J. & Wenger, E. (1991) *Situated Learning*. [Online]. Cambridge University Press.

Lavoie, B. & Gartner, R. (2013) *Preservation Metadata* .

Lawler, C. (2008) Action research as a congruent methodology for understanding wikis: the case of Wikiversity. *Journal of Interactive Media in Education*. [Online] 2008 (1), 6.

Lazzari, M. (2015) '*Pre-adolescenti nella Rete: l'uso di Internet tra gli studenti delle scuole medie*', in M. Lazzari & M. Jacono Quarantino (eds.) Bergamo: Sestante Edizioni. p.

Lazzari, M. & Jacono Quarantino, M. (2013) *Identità, fragilità e aspettative nelle reti sociali degli adolescenti*. Bergamo: Sestante edizioni.

Lazzari, M. & uarantino, M. (2010) *Adolescenti tra piazze reali e piazze virtuali*. Sestante edizioni. (ed.). Bergamo: Bergamo University Press.

Leńko-Szymańska, A. (2017) Training Teachers in Data-Driven Learning: Tack- ling the Challenge. *Special Issue on Corpora in Language Learning and Teaching*. 21 (3), 217–241.

Lent, B. et al. (1997) Discovering Trends in Text Databases. *Key Design Decisions*. 97227–230.

Li, D. (2002) 'Hong Kong parents' preference for English-medium education: Passive victims of imperialism or active agents of pragmatism? ', in A. Kirkpatrick (ed.) *Englishes in Asia: Communication, identity, power, and education* . Melbourne: Language Australia. pp. 29–62.

Library of Congress (2002) *Preserving out Digital Heritage: Plan for the National Digital Information Infrastructure and Preservation Program* [online]. Available from: https://www.digitalpreservation.gov/documents/ndiipp_plan.pdf (Accessed 4 November 2020).

Liegle, J. O. & Janicki, T. N. (2006) The effect of learning styles on the navigation needs of Web-based learners Computers in Human Behavior. *Computers in Human Behavior*. [Online] 22885–898.

Likert, R. (1932) A technique for the measurement of attitudes. *Archives of Psychology*. 22 (140), 885–898.

Littlejohn, A. (2003) Littlejohn, A. (2003) Re-Using online resources: a sustainable approach to e-learning. Chapter 1: Seven issues in the reuse and sharing of Online Resources. *Journal of Interactive Media in Education*. [Online] 2003 (1), 2. [online]. Available from: www-jime.open.ac.uk/2003/1/%5D (Accessed 8 June 2021).

Lloyd, J. (2010) Peering through the SMOG: Adult literacy in the UK and its potential impact upon political marketing communication strategy and content. Political Studies Association Annual Conference 2010

Looney, J. et al. (2015) 'Italy: A system in transition. In Organization of Economic Co-operation and Development, Formative assessment: Improving learning in

secondary classrooms ', in *What works in innovation in education*. Paris: OECD Publishing. pp. 163–175.

Lowden, K. et al. (2013) *Employers' perceptions of the employability skills of new graduates.*

Lowden, K. et al. (2009) *Intelligenc in the flesh Employers' perceptions of the employability skills of new graduates*.

Lowenthal, P. & Hodges, C. (2015) In Search of Quality: Using Quality Matters to Analyze the Quality of Massive, Open, Online Courses (MOOCs). *The International Review of Research in Open and Distributed Learning*. [Online] 16 (5), 83–101.

Lucarelli, A. (2001) *Semplificare il linguaggio burocratico. Meccanismi e tecniche.* . [online]. Available from: https://www.comunicaresulweb.com/scrittura/semplificare-il-linguaggio-burocratico/ (Accessed 8 June 2019).

Lucas, G. (2012) *Understanding the archaeological record*. ew York: Cambridge University Press.

Lucietto, S. (2009) A school-and action research-based continuous professional development model for experienced/senior secondary teachers new to CLIL. CLIL practice: Perspectives from the field, 117-124. - Google Search. *CLIL practice: Perspectives from the field*. 117–124.

Lucisano P. & Piemontese M. E. (1988) GULPEASE: una formula per la predizione della difficoltà dei testi in lingua italiana, in Scuola e città, . *Scuola e città*. XXXIX (2), 110–124.

Lugli, G. & Filibeck, G. (1935) *Il Porto di Roma imperiale e l'Agro Portuense*. Bergamo: Officine dell'Istituto Italiano d' Arti Grafiche.

Lynch, C. A. (2003) Institutional Repositories: Essential Infrastructure For Scholarship In The Digital Age. *portal: Libraries and the Academy*. [Online] 3 (2), 327–336.

Macdonald, F. (2005) *Ancient Rome (Excavating the Past).* Heinemann-Raintree.

Mager, R. F. (1962) *Preparing instructional objectives.*

Mair, O. (2018) 'Four Seasons of CLIL at two Italian Pre-schools', in F. Costa et al. (eds.) *English for Young Learners from Pre-school to Lower Secondary: A CLIL*

Teacher-Training Project in Italian Schools. Mantova: Universitas Studiorum S.r.l. Casa Editrice. pp. 21–54.

Marini, G. (2015) *Ricomincio da Bloom | Insegnanti 2.0* [online]. Available from: https://insegnantiduepuntozero.wordpress.com/2015/08/31/ricomincio-da-bloom/ (Accessed 8 August 2017).

Marlow, J. et al. (2013) 'Impression Formation in Online Peer Production: Activity Traces and Personal Profiles in GitHub', in Ronald S Burt et al. (eds.) *CSCW '13: Proceedings of the 2013 conference on Computer supported cooperative work. February 23–27, 2013, San Antonio, Texas, USA.* 2013 New York, NY, USA: ACM. pp. 117–128.

Marsh, D. et al. (2001) Integrating Competencies for Working Life. . 2001 [online]. Available from: http://www.sciepub.com/reference/103804 (Accessed 4 October 2019).

Marsh, D. & Wolf, D. (2015) *Diverse Contexts – Converging Goals*. [Online]. Peter Lang D.

Marshall, C. & Rossman, G. B. (2010) *Designing Qualitative Research* . 5th Edition. Thousand Oaks, CA : Sage Publications.

Mathur, A. et al. (2018) Mastery of Transferrable Skills by Doctoral Scholars: Visualization using Digital Micro-credentialing. *Change: The Magazine of Higher Learning* . [Online] 50 (5), 38–45.

Mattock, L. K. et al. (2018) A case for digital squirrels: Using and preserving YouTube for popular culture research. *First Monday*. [Online] 23 (1), .

Maurizio Forte (2014) 3D Archaeology. *Journal of Eastern Mediterranean Archaeology & Heritage Studies*. [Online] 2 (1), 1.

McBurnie, G. & Ziguras, C. (2007) *Transnational education: Issues and trends in offshore higher education*. [Online]. Routledge Taylor & Francis Group.

McKeown, S. (2015) *Creating digital leaders initiative in your school. - SecEd* [online]. Available from: http://www.sec-ed.co.uk/best-practice/creating-a-digital-leaders-initiative-in-your-school/ (Accessed 8 August 2017).

McNamara, J. et al. (2013) *The shape of things to come The evolution of transnational education: data, definitions, opportunities and impacts analysis*.

McNiff, J. (2013) *Action research: Principles and practice, 3rd edition*. [Online]. Taylor and Francis.

McPherson, M. & Nunes, M. B. (2004) *Developing innovation in online learning: An action research framework*. [Online]. RoutledgeFalmer Taylor & Francis Group. [online]. Available from: https://www.taylorfrancis.com/https://www.taylorfrancis.com/books/mono/10.4324/9780203426715/developing-innovation-online-learning-maggie-mcpherson-miguel-baptista-nunes.

Means, B. et al. (2013) The effectiveness of online and blended learning: A meta-analysis of the empirical literature. . *Teachers College Record*. 115 (3), 1–47.

Melling, J. & Barry, J. (1992) *Culture in history : production, consumption and values in historical perspective*. Liverpool: Liverpool University Press.

Meltzoff, A. N. et al. (2009) Foundations for a new science of learning. Science 325 (5938) p.284–288. [online]. Available from: https://science.sciencemag.org/content/325/5938/284 (Accessed 8 June 2021).

Meneses, E. L. et al. (2020) 'MOOC in Higher Education from the Student´s Perspective. A sustainable Model? ', in J. L. Sarasola et al. (eds.) *Qualitative and Quantitative Models in Socio-Economic Systems and Social Work*. pp. 207–224.

Meneses, L. et al. (2012) Identifying "Soft 404" Error Pages: Analyzing the Lexical Signatures of Documents in Distributed Collections. *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. [Online] 7489 LNCS197–208.

MiBaC. Ministero per i Beni e le attivita' Culturali (2019) *Piano Triennale per la Digitalizzazione e l'Innovazione dei Musei – Direzione generale Musei*. [online]. Available from: http://musei.beniculturali.it/notizie/notifiche/piano-triennale-per-la-digitalizzazione-e-linnovazione-dei-musei (Accessed 13 April 2020).

Minnucci, E. (2014) *Interrogazione a Risposta scritta n. 4/07060, 28 November 2014.* [online]. Available from: http://dati.camera.it/ocd/aic.rdf/aic4_07060_17 (Accessed 17 February 2017).

MIUR. Ministero dell'Istruzione, dell'Università e della R. (2012) *Indicazioni nazionali per il curricolo della scuola dell'infanzia e del primo ciclo d'istruzione.* [online]. Available from: http://www.indicazioninazionali.it/wp-content/uploads/2018/08/decreto-ministeriale-254-del-16-novembre-2012-

indicazioni-nazionali-curricolo-scuola-infanzia-e-primo-ciclo.pdf (Accessed 8 February 2020).

MIUR. Ministero dell'Istruzione, dell'Università e della R. (2010) *Quadro dei titoli Italiano(QTI).* . [online]. Available from: http://www.processodibologna.it/documenti/Doc/Pubblicazioni/Quadro Italiano dei Titoli dic2010.pdf (Accessed 17 February 2017).

MIUR. Ministero dell'Istruzione, dell'Università e della R. (2017) *Indicazioni nazionali e nuovi scenari (a cura del Comitato scientifico nazionale per l'attuazione delle Indicazioni nazionali e il miglioramento continuo dell'insegnamento).* . [online]. Available from: http://www.indicazioninazionali.it/wp-content/uploads/2018/08/Indicazioni-nazionali-enuovi-scenari.pdf (Accessed 8 May 2018).

MIUR. Ministero dell'Istruzione, dell'Università e della R. (2018) *Una via italiana per il Service Learning - Una via italiana per il Service Learning - Miur*. [online]. Available from: https://www.miur.gov.it/web/guest/-/una-via-italiana-per-il-service-learning (Accessed 13 April 2020).

MIUR. Ministero dell'Istruzione, dell'Università e della R. (2019) *Scuola digitale, arrivano le équipe territoriali: pubblicato il bando. Bussetti: "Al via selezione di 120 docenti, saranno punto di riferimento. Promuoveranno l'innovazione e la formazione dei docenti" - Scuola digitale, arrivano le équipe territoriali: pubblicato il bando. Bussetti: "Al via selezione di 120 docenti, saranno punto di riferimento. Promuoveranno l'innovazione e la formazione dei docenti" - Miur* [online]. Available from: https://www.miur.gov.it/-/scuola-digitale-arrivano-le-equipe-territoriali-pubblicato-il-bando-bussetti-al-via-selezione-di-120-docenti-saranno-punto-di-riferimento-promuoverann (Accessed 17 December 2019).

Miyakita, G. (2017) *Design of Narrative Book Collection Combining Computational and Visualization Approach Exploring Japanese Culture Through Keio University's Pre-Modern Japanese Book Collection*. Tokyo: Keio University. .

Molder, H. & Potter, J. (2005) *Conversation and cognition*. [Online]. Cambridge University Press. [online]. Available from: https://www.cambridge.org/core/books/conversation-and-cognition/670F46B50E7AC5002F751D00DD35E2DB (Accessed 8 June 2021).

Molyneaux, B. L. (1997) 'The Cultural Life of Images', in *The Cultural Life of Images. Visual Representation in Archaeology*. [Online]. Routledge. pp. 1–10.

Monaci, S. (2019) *Cattedre vacanti, incentivi per i prof che restano in regione* [online]. Available from: https://www.ilsole24ore.com/art/cattedre-vacanti-incentivi-i-prof-che-restano-regione-ACyR7Bt?refresh_ce=1 (Accessed 1 April 2020).

Monkman, H. et al. (2020) 'Online medication information for citizens: A comparison of demands on eHealth literacy', in *Studies in Health Technology and Informatics*. [Online]. 16 June 2020 IOS Press. pp. 1026–1030. [online]. Available from: https://ebooks.iospress.nl/doi/10.3233/SHTI200317 (Accessed 8 June 2021).

Montessori, M. (1949) *The Absorbent Mind*.

Moonesar, I. A. et al. (2019) '*Government Innovation and Creativity: A Case of Dubai*', in [Online]. Emerald Publishing Limited. pp. 135–155.

Moore, J. & Kettler, H. S. (2018) Who Cares About 3D Preservation? *IASSIST Quarterly*. [Online] 42 (1), 15–15. [online]. Available from: https://iassistquarterly.com/index.php/iassist/article/view/20 (Accessed 5 November 2019).

Morelli, D. (2006) La diversità linguistica e culturale in Italia. *Annali della Pubblica Istruzione*. 5 (6), 4–66.

Morgan, C. & Eve, S. (2012) DIY and digital archaeology: What are you doing to participate? *World Archaeology*. [Online] 44 (4), 521–537. [online]. Available from: https://www.tandfonline.com/doi/abs/10.1080/00438243.2012.741810 (Accessed 9 June 2021).

Moser, S. & Gamble, C. (1997) 'The Cultural Life of Images', in B. L. Molyneaux (ed.) *The Cultural Life of Images*. [Online]. Routledge. pp. 184–218.

Moser, S. (2014) Reconstructing Ancient Worlds: Reception Studies, Archaeological Representation and the Interpretation of Ancient Egypt. *Journal of Archaeological Method and Theory*. [Online] 22 (4), 1263–1308.

Moser, S. (2012) 'Archaeological visualisation: early artifact illustration and the birth of the archaeological image', in Ian Hodder (ed.) *Archaeological Theory Today*. 2nd Edition Chichester: Polity Press. pp. 292–322.

Moser, S. (2012) 'Archaeological visualisation: early artifact illustration and the birth of the archaeological image', in Ian Hodder (ed.) *Archaeological Theory Today*. 2nd Edition Chichester: Polity Press. pp. 292–332.

Moser, S. (2009) 'Archaeological Representation: The Consumption and Creation of the Past', in B. Cunliffe et al. (eds.) *The Oxford Handbook of Archaeology*. [Online]. Oxford: Oxford University Press. p.

Mozilla (2014) *Badges/Onboarding-Issuer - MozillaWiki* [online]. Available from: https://wiki.mozilla.org/Badges/Onboarding-Issuer#A._Mozilla_Open_Badge_Infrastructure_.28OBI.29 (Accessed 10 November 2019).

Mukherjee, J. (2016) 'Bridging the Gap between Applied Corpus Linguistics and the Reality of English Language Teaching in Germany', in Ulla Connor & Thomas A. Upton (eds.) *Applied Corpus Linguistics: A Multi-Dimensional Perspective*. [Online]. Amsterdam: BRILL. pp. 239–250.

Naidu, S. (2017) How flexible is flexible learning, who is to decide and what are its implications? *Distance Education*. [Online] 38 (3), 269–272.

Nascimbeni, F. (2020) 'Open Educational Resources in Italy.', in Ting Wen Chang et al. (eds.) *Current State of Open Educational Resources in the "Belt and Road" Countries* . [Online]. Singapore: Springer. pp. 49–62.

NatCen Social Research and SQW (2017) *Work experience and related activities in schools and colleges Research report Authors*.

Nelson, S. (2014) *Measuring our first eight courses - FutureLearn* [online]. Available from: https://www.futurelearn.com/info/blog/measuring-our-first-eight-courses (Accessed 20 August 2019).

Nesi, S. (2004) *Il Comandante Nesi: un «Alcione» dalle ali spezzate* . Milano: Lo Scarabeo.

Ng, A. & Widom, J. (2014) 'Origins of the modern MOOC (xMOOC).', in F. M. Hollands & D. Tirthali (eds.) *MOOCs: Expectations and reality. Full report, Center for Benefit-Cost Studies of Education. Teachers College.* New York: Columbia University. pp. 34–41.

Nicholls, M. (2017) *SketchUp In Massive Open Online Courses | SketchUp Blog* [online]. Available from: https://blog.sketchup.com/article/sketchup-in-massive-open-online-courses (Accessed 9 November 2019).

Nicholls, M. (2017) 'Classics and 3D digital modelling at the University of Reading - CentAUR', in D. Fung (ed.) *A connected curriculum for higher education.* London:

UCL Press. pp. 52–53. [online]. Available from:
http://centaur.reading.ac.uk/70730/ (Accessed 1 June 2021).

Nicholls, M. (2019) 'Sketchup and digital modelling for Classics', in Bartolo Natoli &
Steven Hunt (eds.) *Teaching Classics with Technology*. London: Bloomsbury. pp.
131–144.

Nicholls, M. (2016) Digital Visualisation in Classics Teaching and Beyond. *Journal of
Classics Teaching*. [Online] 17 (33), 27–30. [online]. Available from:
https://doi.org/10.1017/S2058631016000076 (Accessed 1 June 2021).

Nkuyubwatsi, B. (2013) *Evaluation of Massive Open Online Courses (MOOCs) from
the learner's perspective*.

Norris, G. et al. (2014) *Introduction to statistics with SPSS for social science*.
Colchester, UK: Informa UK Limited.

O'Malley, J. M. & Chamot, A. U. (1990) *Learning Strategies in Second Language
Acquisition*. [Online]. Cambridge University Press.

O'Riordan, T. (2015) 'How should we measure and show online learning?', in
*Association for Learning Technology Annual Conference 2015: Shaping the
Future of Learning Together, United Kingdom. 08 - 10 Sep 2015.* 9 September
2015 p. [online]. Available from: https://eprints.soton.ac.uk/383411/.

O'Riordan, T. (2018) *Evaluation and automatic analysis of MOOC forum comments*.
University of Southampton. [online]. Available from:
https://eprints.soton.ac.uk/424796/.

O'Riordan, T. et al. (2016) How should we measure online learning activity? *Research
in Learning Technology*. [Online] 24.

O'Riordan, T. et al. (2015) 'Can you tell if they're learning? Using a pedagogical
framework to measure pedagogical activity', in *ICALT 2015: 15th IEEE
International Conference on Advanced Learning Technologies, Taiwan. 06 - 09
Jul 2015*. 20 July 2015 p.

OCSE (2007) *Uno sguardo sull'educazione, Indicatori OCSE*. Armando Editore.

OECD (2017) *In-Depth Analysis of the Labour Market Relevance and Outcomes of
Higher Education Systems: Analytical Framework and Country Practices Report*.

OECD (2013) *OECD Skills Outlook 2013*. [online]. Available from: https://www.oecd-ilibrary.org/education/oecd-skills-outlook-2013_9789264204256-en (Accessed 8 June 2021).

Ofqual (2017) *Get the facts: AS and A level reform - GOV.UK* [online]. Available from: https://www.gov.uk/government/publications/get-the-facts-gcse-and-a-level-reform/get-the-facts-as-and-a-level-reform (Accessed 20 August 2019).

Ojo, P. M. et al. (2020) Readability of selected governmental and popular health organization websites on Covid-19 public health information: A descriptive analysis. *medRxiv*. [Online] 2020.06.27.20141770.

Oliver, M. & Trigwell, K. (2005) Can 'Blended Learning' Be Redeemed? *E-Learning*. 2 (1), .

OLnet (2009) *'What are the barriers to reusing/remixing OER?'* [online]. Available from: http://www.olnet.org/node/119 (Accessed 13 April 2020).

Opazo Carvajal, H. et al. (2016) *A Review of the Situation of Service-Learning in Higher Education in Spain.*

Opitz, R. (2018) Publishing Archaeological Excavations at the Digital Turn. *https://doi.org/10.1080/00934690.2018.1505409*. [Online] 43 (sup1), S68–S82.

Opitz, R. (2015) 'Three Dimensional Field Recording in Archaeology: An Example from Gabii', in O Caraher (ed.) *3D Imaging in Mediterranean Archaeology*. North Dakota: The Digital Press, the University of North Dakota. pp. 64–73.

Optiz, R. et al. (2016) A Mid-Republican House From Gabii. *A Mid-Republican House from Gabii*. [Online]

Ossiannilsson, E. et al. (2016) MOOCs as Change Agents to Boost Innovation in Higher Education Learning Arenas. *Education Sciences 2016, Vol. 6, Page 25*. [Online] 6 (3), 25.

Ossiannilsson, E. et al. (2016) MOOCs as Change Agents to Boost Innovation in Higher Education Learning Arenas. *Education Sciences 2016, Vol. 6, Page 25*. [Online] 6 (3), 25. [online]. Available from: https://www.mdpi.com/2227-7102/6/3/25/htm (Accessed 15 October 2020).

Panke, S. et al. (2019) Digital Citizenship meets Open Educational Resources: Local Government Open... *E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare,...* 2019 (1), 901–912.

Paolillo, J. C. (2008) Structure and network in the YouTube core. *Proceedings of the Annual Hawaii International Conference on System Sciences.* [Online]

Papadimitriou, S. T. & Niari, M. I. (2019) Open Badges as Credentials in Open Education Systems: Case Studies from Greece and Europe. *Journal of Learning for Development.* 6 (1), 49–63.

Papadopoulos, C. (2020) *Course: Remaking Material Culture in 3D* [online]. Available from: https://teach.dariah.eu/course/view.php?id=55 (Accessed 4 June 2021).

Pappano, L. (2012) *Massive Open Online Courses Are Multiplying at a Rapid Pace* [online]. Available from: https://www.nytimes.com/2012/11/04/education/edlife/massive-open-online-courses-are-multiplying-at-a-rapid-pace.html?pagewanted=all&_r=0 (Accessed 17 February 2017).

Parr, C. (2013) *MOOC creators criticise courses' lack of creativity.*

Parr, C. (2013) *Mooc completion rates 'below 7%'* [online]. Available from: http://www.katyjordan.com/MOOCproject.html (Accessed 10 May 2020).

Pawson, R. (2006) *Evidence-Based Policy: A realist perspective.*

Pawson, R. & Tilley, N. (1997) *Realistic evaluation.* London: Sage.

Pearce-Moses, R. (2005) *A Glossary of Archival and Records Terminology.* Chicago: The Society of American Archivists. [online]. Available from: www.archivists.org (Accessed 1 November 2017).

Pennebaker, J. W. et al. (2003) Psychological Aspects of Natural Language Use: Our Words, Our Selves. Annual Review of Psychology 54 p.547–577.

Perestelo-Perez, L. et al. (2020) IC-health project: Development of MOOCs to promote digital health literacy: First results and future challenges. *Sustainability (Switzerland).* [Online] 12 (16), 38109.

Perez-Pena, R. (2013) *Harvard Asks Graduates to Donate Time to Free Online Humanities Class. - The New York Times* [online]. Available from:

https://www.universityworldnews.com/post.php?story=20130329141837662 (Accessed 15 June 2017).

Perguna, L. A. et al. (2020) From Content to Context: Understanding Introduction to Sociology through MOOC. *International Journal of Emerging Technologies in Learning (iJET)*. 15 (07), 188–195. [online].

Perkins, J. & Pryor, M. (2021) Digital badges: Pinning down employer challenges. *Journal of Teaching and Learning for Graduate Employability*. [Online] 12 (1), 24–38.

Perry, S. E. et al. (2015) 'Crafting knowledge with (digital) visual media in archaeology', in R. Chapman & A. Wylie (eds.) *Material Evidence: Learning from Archaeological Practice.* London: Routledge. pp. 189–210.

Perry, S. E. (2011) *The archaeological eye: visualisation and the institutionalisation of academic archaeology in London*. University of Southampton.

Perry, S. & Beale, N. (2015) The social web and archaeology's restructuring: Impact, exploitation, disciplinary change. *Open Archaeology*. [Online] 1 (1), 153–165.

Peterson, R. (2000) *Constructing Effective Questionnaires*. [Online]. SAGE Publications, Inc.

Picciano, A. G. & Seaman, J. (2019) K-12 Online learning: a survey of U.S. School District Administrators. *Online Learning*. [Online] 11 (3), .

Piccini, A. (2014) *Theory in the Public Eye*. [Online]. Oxford University Press.

Piemontese, M. E. (1996) *Capire e farsi capire : teorie e tecniche della scrittura controllata* . Napoli: Tecnodid.

Pizer, J. (2000) Goethe's 'World Literature' Paradigm and Contemporary Cultural Globalization. *Comparative Literature*. [Online] 52 (3), 213.

Poce, A. et al. (2019) Establishing a MOOC quality assurance framework – a case study. *Open Praxis*. [Online] 11 (4), 451–460. [online]. Available from: https://openpraxis.org/articles/10.5944/openpraxis.11.4.1019/ (Accessed 18 May 2020).

Polites, G. L. (2009) *The duality of habit in information technology acceptance*. University of Georgia.

Pomerantz, J. (2018) *Orphan MOOCs and the Digital Dark Ages - Hybrid Pedagogy* [online]. Available from: https://hybridpedagogy.org/orphan-moocs-digital-dark-ages/ (Accessed 18 October 2020).

Pomerantz, J. (2018) *Learning in Three Dimensions: Report on the EDUCAUSE/HP Campus of the Future Project.* [online]. Available from: http://www.educause.edu. (Accessed 7 June 2021).

Postlethwait, S. N. (1968) Audio-tutorial system. *Journal of Animal Science*. [Online] 27 (Symposium), 938–940.

Postlethwait, S. et al. (1972) The audio-tutorial approach to learning, through independent study and integrated experiences. *undefined*.

Pozzi, F. & Conole, G. (2014) Quale futuro per i MOOC in Italia? *Italian Journal of Educational Technology*. [Online] 22 (3), 173–182. [online]. Available from: https://ijet.itd.cnr.it/article/view/187 (Accessed 6 June 2021).

Prelinger, R. (2009) 'The appearance of archives', in P. Snickars & P. Vonderau (eds.) *The YouTube Reader*. Stockholm: National Library of Sweden. pp. 268–274.

Priniski, S. J. et al. (2018) Making Learning Personally Meaningful: A New Framework for Relevance Research. *Journal of Experimental Education*. [Online] 86 (1), 11–29. [online]. Available from: https://www.tandfonline.com/action/journalInformation?journalCode=vjxe20 (Accessed 8 June 2021).

Prpict, J. et al. (2015) View of MOOCs and crowdsourcing: Massive courses and massive resources. *First Monday*. 20 (12), . [online]. Available from: https://journals.uic.edu/ojs/index.php/fm/article/view/6143/5170 (Accessed 10 July 2017).

Ransom, L. S. (2009) Sowing the seeds of citizenship and social justice: Service-learning in a public speaking course. *Education, Citizenship and Social Justice*. [Online] 4 (3), 211–224.

Ravet, S. (2015) *#OpenBadges: "micro-credentials" vs. "progressive-credentials" – Learning Futures* [online]. Available from: https://www.learningfutures.eu/2015/11/openbadges-micro-credentials-vs-progressive-credentials/ (Accessed 11 November 2019).

Redecker, C. (2017) *European framework for the digital competence of educators: DigCompEdu* Y. Punie (ed.).

Reich, J. (2014) *MOOC Completion and Retention in the Context of Student Intent* [online]. Available from: https://er.educause.edu/articles/2014/12/mooc-completion-and-retention-in-the-context-of-student-intent (Accessed 7 June 2021).

Reich, J. & Ruipérez-Valiente, J. A. (2019) The MOOC Pivot: From Teaching the World to Online Professional Degrees. *Science*. [Online] 363 (6423), 130–131.

Reilly, P. (1991) 'Towards a Virtual Archaeology', in S. Rahtz & K. Lockyear (eds.) *CAA90. Computer Applications and Quantitative Methods in Archaeology 1990 (BAR International Series 565)*. 1991 Oxford: Tempus Reparatum. pp. 132–139.

Requena, F. & Ayuso, L. (2019) Individualism or complementarity? The effect of digital personal networks on face-to-face personal networks. *Information Communication and Society*. [Online] 22 (14), 2097–2111. [online]. Available from: https://www.tandfonline.com/doi/abs/10.1080/1369118X.2018.1477968 (Accessed 8 June 2021).

Reynolds, G. (2015) Constructing New Town Identity: Myth, Heritage & ImagiNation. *eSharp*. (23), 1–17.

Ricci Garotti, F. (2007) 'Five methodological research questions for CLIL.', in G. Bach et al. (eds.) *Diverse contexts–Converging goals: CLIL in Europe.* . Frankfurt: Peter Lang. pp. 25–36.

Rivoltella, P. C. (2016) *Fare didattica con gli EAS. Episodi di Apprendimento Situato*. Brescia : La Scuola.

Rodriguez, O. (2013) The concept of openness behind c and x-MOOCs (Massive Open Online Courses). *Open Praxis*. [Online] 5 (1), 67–73.

Rogers, K. E. (2019) *Off the Record: Archaeology and Documentary Filmmaking.* University of Southampton. [online]. Available from: https://eprints.soton.ac.uk/437261/ (Accessed 8 February 2020).

Römer, U. (2009) 'Corpus research and practice: What help do teachers need and what can we offer?', in K. Aijmer (ed.) *Corpora and Language Teaching*. [Online]. Amsterdam: John Benjamins. pp. 83–98.

Rosewell, J. (2015) 'Benchmarks for MOOCs: the OpenupEd quality label', in *International Conference on Enhancement and Innovation in Higher Education, 9-11 Jun 2015,*. 2015 Glasgow: . p. [online]. Available from: http://www.enhancementthemes.ac.uk/pages/docdetail/docs/paper/benchmarks-for-moocs-the-openuped-quality-label (Accessed 26 October 2020).

Rosewell, J. & Jansen (2014) The OpenupEd quality label: benchmarks for MOOCs. *INNOQUAL: The International Journal for Innovation and Quality in Learning*. 2 (3), 88–100.

Ross, S. (2004) The Role of ERPANET in Supporting Digital Curation and Preservation in Europe European Commission: Cultural Heritage View project DL.org-Coordination Action on Digital Library Interoperability, Best Practices, and Modelling Foundations View project. *D-Lib Magazine*. [Online] 10 (7/8), .

Rossi, P. G. (2012) *Didattica enattiva. Complessità, teorie dell'azione, professionalità docente* . Milano: Franco Angeli.

Rossi, P. O. (2015) 'Il progetto per il parco del Porto di Traiano, venticinque anni dopo.', in A. Bruschi (ed.) *Portus, Ostia Antica, via Severiana. Il Sistema archeologico paesaggistico della linea di costa di Roma imperiale*. Roma: DiAP Print. pp. 75–84.

Rota, M. B. (2012) Cqia Rivista Sapere, saper fare e saper essere, solidali. La proposta dell' Aprendizaje y Servicio Solidario,. Intervista a Maria Nieves Tapia. *Cqia Rivista, Formazione persona lavoro*. 2 (4), 281–295.

Rowlands, G. et al. (2013) *The Information Standard Workshop Handouts Understanding Health Literacy-10th*.

Roy, D. et al. (2010) 'A Comparative Study of Learning Object Metadata, Learning', in M. Joshi et al. (eds.) *Advances in Semantic Computing*. Wiley. pp. 103–126.

Ruipérez-Valiente, J. et al. (2019) *Macro MOOC Learning Analytics: Exploring Trends Across Global and Regional Providers*. [Online]

Sá, A. M. et al. (2019) 'Accessible digitisation and visualisation of open cultural heritage assets', in *GCH 2019 - Eurographics Workshop on Graphics and Cultural Heritage*. [Online]. 2019 Eurographics Association. pp. 59–68.

Saettler, P. (2004) *The Evolution of American Educational Technology* . IAP, Information Age Publishing.

Saettler, P. (1968) *A History of Instructional Technology.* New York: McGraw-Hill.

Sandeen, C. (2013) Integrating MOOCS into Traditional Higher Education: The Emerging "MOOC 3.0" Era. *Change: The Magazine of Higher Learning.* [Online] 45 (6), 34–39. [online]. Available from: https://www.tandfonline.com/doi/abs/10.1080/00091383.2013.842103 (Accessed 7 June 2021).

Sanderson, R. et al. (2013) *Open Annotation Data Model*.

Santagata, W. (2014) *Il governo della cultura. Promuovere sviluppo e qualità sociale*. Bologna: Il Mulino.

Santarpia, V. (2019) *Prof, oltre 53 mila assunzioni: un posto su cinque è in Lombardia, mancano 5 mila docenti* [online]. Available from: https://www.corriere.it/scuola/secondaria/19_agosto_01/prof-oltre-53-mila-assunzioni-ma-posto-cinque-lombardia-6f2d8828-b43b-11e9-a4d8-63bea28b5635.shtml (Accessed 1 April 2020).

Schaeffer-Lacroix, E. (2019) 'Barriers to trainee teachers' corpus use', in *Data-Driven Learning for the Next Generation*. [Online]. Routledge. pp. 47–64.

Schmid, L. et al. (2015) Fulfilling the promise: do MOOCs reach the educationally underserved? *Educational Media International*. [Online] 52 (2), 116–128. [online]. Available from: https://www.tandfonline.com/doi/abs/10.1080/09523987.2015.1053288 (Accessed 7 June 2021).

Schultz, L. (2005) *Old Dominion University: Bloom's taxonomy.* [online]. Available from: http://ww2.odu.edu/educ/roverbau/Bloom/blooms_taxonomy.htm (Accessed 1 April 2016).

Sciacchitano, E. (2015) *Dall'Europa, uno sguardo nuovo al patrimonio culturale* [online]. Available from: http://www.ilgiornaledellefondazioni.com/content/ dalleuropa-uno-sguardo-nuovo-al-patrimonio-culturale (Accessed 15 August 2017).

Sciacchitano, E. (2015) *Al nastro di partenza il nuovo piano di lavoro UE 2015-2018 per la cultura* [online]. Available from: http://www.ilgiornaledellefondazioni.com/content/al-nastro-di-partenza-il-nuovo-piano-di-lavoro-ue-2015-2018-la-cultura (Accessed 15 August 2017).

Sengsavang, E. (2020) *Our Common Digital Future: Digital Preservation and the United Nations Sustainable Development Goals - Digital Preservation Coalition* [online]. Available from: https://www.dpconline.org/blog/wdpd/blog-eng-sengsavang-wdpd (Accessed 10 April 2021).

Serragiotto, G. (2011) 'CLIL Methodology in Italy.', in *Bilingual Research*. The Korean Society of Bilingualism,. pp. 375–403.

Shahri, A. et al. (2020) Engineering digital motivation in businesses: a modelling and analysis framework. *Requirements Engineering*. [Online] 25 (2), 153–184.

Sharples, M. (2019) 'Visions for the Future of Educational Technology', in R. Ferguson et al. (eds.) *Educational visions: The lessons from 40 years of innovation*. [Online]. Ubiquity Press. pp. 151–166.

Sharples, M. & Ferguson, R. (2019) *Pedagogy-informed Design of Conversational Learning at Scale*.

Shi, L. & Cristea, A. I. (2018) 'Demographic indicators influencing learning activities in MOOCs : learning analytics of FutureLearn courses.', in B. Andersson et al. (eds.) *Information Systems Development: Designing Digitalization (ISD2018 Proceedings)*. 31 October 2018 Lund, Sweden: Lund University. . p.

Shrock, S. A. & Coscarelli, W. C. (2007) *Criterion-referenced Test Development: Technical and Legal Guidelines for Corporate Training*. San Francisco: Pfeiffer.

Siemens, G. et al. (2013) Guest Editors' Preface to the Special Issue on MOOCs An Academic Perspective on an Emerging Technological and Social Trend. *MERLOT Journal of Online Learning and Teaching*. 9 (2), . [online]. Available from: http://jolt.merlot.org/vol9no2/irvine_0613.htm (Accessed 7 June 2021).

Sigmon, R. (1979) Service-learning: Three principles. . *Synergist*. 8 (1), 9–11.

Silari, F. (2019) *Massive Open Online Course: 'un audace esperimento di apprendimento distribuito' nelle università*.

Simon, R. et al. (2015) 'The Pleiades Gazetteer and the Pelagios Project.', in Ruth Merrick Lex Berman & Humphrey Southall Mostern (eds.) *Placing Names: Enriching and Integrating Gazetteers*. . p. [online]. Available from: https://iupress.org/9780253022448/placing-names/ (Accessed 8 June 2021).

Sims, L. (2014) *Visitor's Guide to Ancient Rome*. Rome: Usborne Publishing. [online]. Available from: https://www.amazon.co.uk/Visitors-guide-Ancient-Guides-Visitor/dp/1409577554 (Accessed 8 June 2021).

Sisti, F. (2012) 'CLIL Experiences in Online Higher Education', in AA. VV (ed.) *I Congreso Internacional de Enseñanza Bilingüe en Centros Educativos* . 2012 Madrid: Universidad Rey Juan Carlos. pp. 1–17.

Skinner, B. F. (1968) *The technology of teaching*. New York, NY: Appleton-Century-Croft.

Smiles, S. & Moser, S. (2008) *Envisioning the Past: Archaeology and the Image*. [Online]. Blackwell Publishing Ltd.

Smith, L. (2012) *5 education providers offering MOOCs now or in the future* [online]. Available from: https://www.highereddive.com/news/5-mooc-providers/44506/ (Accessed 15 June 2017).

Solima, L. (2012) *Il museo in ascolto* . Rubbettino editore (ed.). Soveria Mannelli.

Sousa, M. J. & Rocha, Á. (2019) Digital learning: Developing skills for digital transformation of organizations. *Future Generation Computer Systems*. [Online] 91327–334.

Spadaccino, M. R. (2014) *Ostia Antica, la città segreta è più grande di Pompei.* [online]. Available from: http://roma.corriere.it/roma/notizie/cronaca/14_aprile_16/ostia-antica-citta-oltre-fiume-10df75d8-c585-11e3-ab93-8b453f4397d6.shtml (Accessed 21 August 2017).

Spadaccino, M. R. (2016) *Portus, l'antico porto di Roma: il parco, il mare e le navi romane* [online]. Available from: https://roma.corriere.it/notizie/cultura_e_spettacoli/16_marzo_26/parco-mare-navi-romane-ecco-portus-l-antico-porto-roma-f9d91d92-f397-11e5-aa73-ceab61eba560.shtml (Accessed 21 August 2017).

Spector, J. M. (2014) Emerging educational technologies: Tensions and synergy. *Journal of King Saud University - Computer and Information Sciences*. [Online] 26 (1), 5–10.

Spence, P. & Brandão, R. (2019) Attitudes towards digital culture and technology in the Modern Languages. Digital Mediations [online]. Available from: http://doi.org/doi:10.18742/pub01-001 (Accessed 7 June 2021).

Splnews (2017) *Scuola, cattedre libere 2017/8: supplenze graduatorie istituto, Ata e sostegno* [online]. Available from: https://it.blastingnews.com/lavoro/2017/08/scuola-cattedre-libere-20178-supplenze-graduatorie-istituto-ata-e-sostegno-001953525.html (Accessed 1 April 2020).

Squires, N. (2013) *Romans 'destroyed Portus palace as barbarians approached'* [online]. Available from: https://www.telegraph.co.uk/news/worldnews/europe/italy/10443764/Romans-destroyed-Portus-palace-as-barbarians-approached.html (Accessed 6 June 2021).

Stefaniak, J. & Carey, K. (2019) Instilling purpose and value in the implementation of digital badges in higher education. *International Journal of Educational Technology in Higher Education*. [Online] 16 (1), 1–21.

Stone, P. G. & Molyneaux, B. L. (1994) *The Presented Past*. [Online]. London: Routledge.

Straumsheim, C. (2014) *After #MassiveTeaching, questions about MOOC quality control - Inside Higher Ed* [online]. Available from: https://www.insidehighered.com/news/2014/07/15/after-massiveteaching-questions-about-mooc-quality-control (Accessed 10 April 2021).

Stuermer, M. et al. (2016) Digital sustainability: basic conditions for sustainable digital artifacts and their ecosystems. *Sustainability Science 2016 12:2*. [Online] 12 (2), 247–262.

Stürmer, M. (2014) Characteristics of digital sustainability. *ACM International Conference Proceeding Series*. [Online] 2014-January494–495.

SURF (2016) *Whitepaper on open badges and micro-credentials*.

Surman, M. (2011) *Mozilla Launches Open Badges Project* [online]. Available from: https://blog.mozilla.org/en/mozilla/openbadges/ (Accessed 7 June 2021).

Sylvén, L. K. (2013) CLIL in Sweden - why does it not work? A metaperspective on CLIL across contexts in Europe. *International Journal of Bilingual Education and*

Bilingualism. [Online] 16 (3), 301–320. [online]. Available from: https://www.tandfonline.com/doi/abs/10.1080/13670050.2013.777387 (Accessed 7 June 2021).

Takeda, K. et al. (2013) Enhancing research publications using Rich Interactive Narratives. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*. [Online] 371 (1983), . [online]. Available from: http://dx.doi.org/10.1098/rsta.2012.0090 (Accessed 8 June 2021).

Tapia, M. N. (2006) *Educazione e solidarietà. La pedagogia dell'apprendimento-servizio* . Città Nuova.

Tapia, M. N. (2010) Service learning widespread in Latin America. *Phi Delta Kappan*. [Online] 91 (5), 31–32. [online]. Available from: www.icicp. (Accessed 8 June 2021).

Tátrai, F. & Mihályi, K. (2019) Open Badges in Education and Training in Europe. *Opus et Educatio*. [Online] 5 (4). [online]. Available from: http://opuseteducatio.hu/index.php/opusHU/article/view/284/500 (Accessed 10 November 2020).

Tausczik, Y. R. & Pennebaker, J. W. (2010) The psychological meaning of words: LIWC and computerized text analysis methods. Journal of Language and Social Psychology 29 (1) p.24–54. [online]. Available from: http://jls.sagepub.com (Accessed 8 June 2021).

Taylor, C. (1998) *Language to Language: A Practical and Theoretical Guide for Italian/English Translators (Cambridge Applied Linguistics)*. Cambridge : Cambridge University Press.

Taylor, R. (2009) *British archaeologists unearth emperor's private amphitheatre | The Times* [online]. Available from: https://www.thetimes.co.uk/article/british-archaeologists-unearth-emperors-private-amphitheatre-dg8wkwjmbsb (Accessed 21 August 2017).

Terdiman, D. (2012) *Forget LinkedIn: Companies turn to GitHub to find tech talent - CNET* [online]. Available from: https://www.cnet.com/tech/gaming/forget-linkedin-companies-turn-to-github-to-find-tech-talent/ (Accessed 10 November 2019).

Terzo Binario News (2016) *Gli scavi di Ostia Antica includono i porti imperiali di Claudio e Traiano e la necropoli di porto a Fiumicino* [online]. Available from:

https://www.terzobinario.it/gli-scavi-ostia-antica-includono-porti-imperiali-claudio-traiano-la-necropoli-porto-fiumicino/ (Accessed 15 June 2017).

The Mozilla Foundation et al. (2012) *Open Badges for Lifelong Learning Exploring an open badge ecosystem to support skill development and lifelong learning for real results such as jobs and advancement*.

Theimer, K. (2012) Archives in Context and as Context. *Journal of Digital humanities*. 1 (2), . [online]. Available from: http://journalofdigitalhumanities.org/1-2/archives-in-context-and-as-context-by-kate-theimer/ (Accessed 1 January 2021).

Theimer, K. (2014) *Reference and access : innovative practices for archives and special collections*.

Tilley, N. (2000) *Realistic Evaluation: An Overview* [online]. Available from: https://www.researchgate.net/publication/252160435_Realistic_Evaluation_An_Overview.

Tino C. & Grion, V. (2019) *Valutare le competenze trasversali in alternanza scuola-lavoro. Modelli e strumenti - Concetta Tino - Valentina Grion - - Libro - Anicia (Roma) - Apprendere e progettare. Supporti didattici | IBS*. Roma: Anicia.

Tino, C. & Grion, V. (2018) Lo sviluppo delle soft skills in Alternanza Scuola-Lavoro: punti di vista degli studenti italiani . *Ricerche di Pedagogia e Didattica*. 13 (1), 121–149. [online]. Available from: https://www.academia.edu/37570294/Lo_sviluppo_delle_soft_skills_in_Alternanza_Scuola_Lavoro_punti_di_vista_degli_studenti_italiani (Accessed 8 June 2021).

Torres-Coronas, T. & Vidal-Blasco, M. A. (2017) MOOC and blended learning models: Analysis from a stakeholders' perspective. *International Journal of Information and Communication Technology Education*. [Online] 13 (3), 88–99.

Toscano, M. A. (2000) *Dall'incuria All'illegalità. I Beni Culturali Alla Prova Della Coscienza Collettiva*. Milano: Jaca Book.

Tribble, C. (2015) 'Teaching and language corpora', in A. Leńko-Szymańska & B. Boulton (eds.) *Multiple Affordances of Language Corpora for Data-driven Learning*. [Online]. pp. 37–62.

Trinchero R. (2016) *Costruire, valutare, certificare competenze. Proposte di attività per la scuola - Trinchero Roberto, Franco Angeli, Trama libro, 9788820417741 | Libreria Universitaria*. Milano: Franco Angeli.

TU Delft (2015) *Virtual exchange, based on Credits for MOOCs.* [online]. Available from: http://studenten.tudelft.nl/en/students/education/credits-for-moocs/?sa=U&ei=8WJqT7XcHIyB4ATpkIGSBg&ved=0CD8QFjANOGQ&usg=AFQjCNE5GlDBbPGKu9zm06Z1Cp82PuAimw (Accessed 21 August 2017).

Tufekci, Z. (2017) *Twitter and tear gas: the power and fragility of networked protest.* New Haven, CT: Yale Univerisity Press.

Tyler, R. W. (1949) *Basic Principles of Curriculum and Instruction* . Chicago: Chicago University Press.

UNESCO (2020) *Distance learning strategies in response to COVID-19 school closures - UNESCO Digital Library*. [online]. Available from: https://unesdoc.unesco.org/ark:/48223/pf0000373305 (Accessed 5 June 2021).

UNESCO (2020) *UNESCO COVID-19 education response: Virtual knowledge-sharing workshop on distance education programmes using radio and television, 27 May 2020: summary report* . [online]. Available from: https://unesdoc.unesco.org/ark:/48223/pf0000373576 (Accessed 5 June 2021).

United Nations (1987) *Report of the World Commission on Environment and Development: Our Common Future. UN Documents: Gathering a Body of Global Agreement*. [online]. Available from: http://www.un-documents.net/wced-ocf.htm (Accessed 2 February 2021).

Ursani, A. A. et al. (2014) Bloom's taxonomy as a pedagogical model for signals and systems. *International Journal of Electrical Engineering and Education*. [Online] 51 (2), 162–173.

van der Meer, J. et al. (2015) Shorter Is Better: Findings of a Bite-Size Mobile Learning' Pilot Project. *Creative Education*. [Online] 06 (03), 273–282.

van Dijck, J. (2013) The Culture of Connectivity: A Critical History of Social Media. *The Culture of Connectivity: A Critical History of Social Media*. [Online] 1–240.

Vannini, I. (2019) *La Qualità nella didattica - Libri - Erickson*. Trento: Erickson. [online]. Available from: https://www.erickson.it/it/la-qualita-nella-didattica (Accessed 7 August 2017).

Varagnoli, C. (2013) *L'episcopio di Porto (Fiumicino) tra continuità e rinascita: l'età moderna – Rome, le Tibre, le littoral* [online]. Available from: https://romatevere.hypotheses.org/520 (Accessed 6 June 2021).

Vázquez Cano, E. et al. (2013) La expansión del conocimiento en abierto: Los MOOCs [The expansión of open knowledge: the MOOCs]. *International Journal of Educational Technology in Higher Education 2015 12:1*. [Online] 12 (1), 145–150.

Verstegen, D. M. L. et al. (2018) How do Virtual Teams Collaborate in Online Learning Tasks in a MOOC? *International Review of Research in Open and Distributed Learning*. 19 (4), 39–55.

Victoria and Albert Museum (2016) *Strategy for Access, Inclusion and Diversity*. [online]. Available from: https://vanda-production-assets.s3.amazonaws.com/2020/10/15/09/03/52/b7a4469d-b6b1-4920-a59e-26c4f75a79d8/VARPT2009-200929-signatures FINAL Full PDF.pdf (Accessed 6 June 2021).

Vigilante, A. (2014) Il Service Learning: come integrare ed impegno sociale. *Educazione democratica*. VII155–193.

Viroli, M. (2020) *Per amore della patria: Patriottismo e nazionalismo nella storia* . Bari-Roma: Laterza.

VISKA Project (2017) *Briefing paper on Transversal Skills Deliverable D1.1. of the VISKA Project*. [online]. Available from: https://viskaproject.eu/wp-content/uploads/2018/02/D1.1_TS_VISKA_FINAL.pdf (Accessed 6 June 2021).

Wald, M. (2010) Synote: supporting assessment using annotated recordings. *Presented in Computer Applications and Quantitative Methods in Archaeology conference, Southampton 2010*. [online]. Available from: https://eprints.soton.ac.uk/271486/1/Wald-CAA2010.pdf (Accessed 6 June 2021).

Wald, M. (2018) 'Using Speech Recognition Transcription to enhance learning from lecture recordings', in *International Conference on Education and New Developments*. 2018 Budapest, Hungary. 23 - 25 Jun 2018.: . pp. 111–115.

Wald, M. (2018) 'Using Speech Recognition Transcription to enhance learning from lecture recordings', in *International Conference on Education and New Developments*. 2018 Budapest, Hungary. 23 - 25 Jun 2018.: . pp. 111–115.

Wald, M. (2016) 'A personal reflection on developing a digital accessibility MOOC compared to developing a traditional course', in Klaus Miesenberger et al. (eds.) *Computers Helping People with Special Needs. Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*. [Online]. 2016 Springer Verlag. pp. 425–428.

Wald, M. et al. (2009) 'Synchronised annotation of multimedia', in *Proceedings - 2009 9th IEEE International Conference on Advanced Learning Technologies, ICALT 2009*. [Online]. 2009 pp. 594–596.

Wang, K. & Zhu, C. (2019) MOOC-based flipped learning in higher education: students' participation, experience and learning performance. *International Journal of Educational Technology in Higher Education*. [Online] 16 (1), 1–18. [online]. Available from: https://link.springer.com/articles/10.1186/s41239-019-0163-0 (Accessed 20 February 2021).

Wang, L. W. et al. (2013) Assessing readability formula differences with written health information materials: Application, results, and recommendations. *Research in Social and Administrative Pharmacy*. [Online] 9 (5), 503–516. [online]. Available from: https://pubmed.ncbi.nlm.nih.gov/22835706/ (Accessed 5 June 2021).

Wang, X. et al. (2020) Measuring university students' technostress in technology-enhanced learning: Scale development and validation. *Australasian Journal of Educational Technology*. [Online] 2020 (4), 96–112. [online]. Available from: https://ajet.org.au/index.php/AJET/article/view/5329 (Accessed 5 June 2021).

Warren, A. (2014) *RE: Italian language on the MOOC - Archaeology of Portus: Exploring the Lost Harbour of Ancient Rome* [online]. Available from: http://moocs.southampton.ac.uk/portus/2014/03/11/italian-language-mooc/#comment-3647 (Accessed 7 April 2020).

Warschauer, M. (2002) Reconceptualizing the digital divide. *First Monday*. [Online] 7 (7).

White, S. (2014) *Exploring stakeholder perspectives on the development of MOOCs in higher education – a case study of the University of Southampton*. University of Southampton,. [online]. Available from: https://eprints.soton.ac.uk/377160/ (Accessed 6 June 2021).

Whittaker, S. et al. (1994) 'Filochat handwritten notes provide access to recorded conversations.', in *CHI94-Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. 1994 Boston, Massachusetts: ACM. pp. 271–277.

Wiley, D. (2012) *The MOOC Misnomer. Iterating toward openness blog* [online]. Available from: https://opencontent.org/blog/archives/2436 (Accessed 7 August 2017).

Williams, T. (2014) 'Archaeology: Reading the City through Time', in *Reconnecting the City: The Historic Urban Landscape Approach and the Future of Urban Heritage*. Wiley Blackwell. pp. 17–45. [online]. Available from: http://whc.unesco.org/en/activities/498/ (Accessed 30 May 2021).

Wilson, J. et al. (2010) Developing Infrastructure for Research Data Management at the University of Oxford. *Ariadne: A Web & Print Magazine of Internet Issues for Librarians & Information Specialists*. 30 (65), . [online].

Wilson, S. & Coles, S. (2010) 'Second Life: the next virtual laboratory?', in *Education and New Learning Technologies - EduLearn10 Proceeding*. 2010 Barcelona, Spain:04 - 06 Jul 2010: . pp. 4282–4287.

Wintrup, J. et al. (2015) *Engaged learning in MOOCs: a study using the UK Engagement Survey*. York: Higher Education Academy. [online]. Available from: https://eprints.soton.ac.uk/373640/ (Accessed 5 June 2021).

Wissik, T. & Ďurčo, M. (2016) *Technical Report on Project Portal Development Revision: 1.6*. [online]. Available from: https://teach-blog.dariah.eu/wp-content/uploads/2016/01/D13_TechnicalReportonProjectPortalDevelopment_v1.6_final_updated-3.pdf (Accessed 5 November 2020).

World Economic Forum (2020) *The rise of online learning during the COVID-19 pandemic* [online]. Available from: https://www.weforum.org/agenda/2020/04/coronavirus-education-global-covid19-online-digital-learning (Accessed 7 August 2020).

Yaşar, M. Ö. (2020) Can MOOCs Promote EFL Learners' English Communication Skills? Language and Technology 2 (1). [online]. Available from: https://dergipark.org.tr/en/pub/lantec/659394 (Accessed 5 June 2021).

Yousef, A. M. F. et al. (2014) 'Video-Based Learning: A Critical Analysis of The Research Published in 2003-2013 and Future Visions - RWTH Publications', in *The Sixth International Conference on Mobile, Hybrid, and On-line Learning : eLmL 2014*. 2014 Barcelona, Spain: . pp. 112–119. [online]. Available from: https://publications.rwth-aachen.de/record/226658 (Accessed 5 June 2021).

Yu, C. (2015) Challenges and Changes of MOOC to Traditional Classroom Teaching Mode. *Canadian Social Science*. [Online] 11 (1), 135–139. http://dx.doi.org/10.3968/6023.

Zawilska, A. (2018) *An ethnomethodologically-informed study of interaction in the MOOC* . University of Oxford. [online]. Available from: https://ora.ox.ac.uk/objects/uuid:97553e29-a79a-44a7-9f83-745f95446dcd (Accessed 5 June 2021).

Zentner, S. (2011) *Lernen durch Engagement – Service-learning in German Schools. A Promising Way to Get Youth Involved – in Active Learning and in Civic Engagement.* . Weinheim: Freudenberg Foundation.

Laws

Apprenticeships, Skills, Children and Learning Act 2009

Legge Finanziaria 2019

Circolare Ministeriale n. 101, 30 December 2010

Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds.

Decreto Ministeriale n. 9, 27 January 2010

Decreto Ministeriale n. 50, 18 June 2018

Decreto Mnisteriale n.139, 22 August 2007

Education Act 1902

Education Act 1944

Education Act 1964, Chapter 82 HMSO. 1964. p. 1

Education Act 1980

Education Act 1981

Education Act 1986

Education Act 2002

Education and Skills Act 2008

Education Reform Act of 1988

Elementary Education Act 1870

Financial Law 2007

Further and Higher Education Act 1992

Further Education and Training Act 2007

International Convernat on Economic, Social and Cultural Rights, art. 15

Italian Constitution, 1948

Learning and Skills Act 2000

Law n. 30, 10 February 2000

Law n. 53, 28 March 2003 - known as Moratti reform.

Law n. 107, 13 July 2015 - known as Buona Scuola

Law n. 133, 6 August 2008

Law n. 169, 30 october 2008 – known as Gelmini Reform

Law n. 296, 27 December 2006

Law n. 407, 8 July 1904 – known as Legge Orlando.

Law n. 425, 10 December 1997

Law n. 482, 15 December 1999

Law n. 487, 4 June 1911 – known as Legge Daneo-Credaro.

Law n. 2008/3, 19 February 1992

Law n. 3961, 15 July 1877 – know as Legge Coppino

Law n. 3725, 13th November 1859 – Known as Casati Act

Lazio Region Law n. 2008/3, 19 February 1992

Royal legislative decrees of 31 December 1922, n. 1679

Royal legislative decrees of 16 July 1923, n. 1753

Royal legislative decrees of 6 May 1923, n. 1054

Royal legislative decrees of 30 September 1923, n. 2102

Royal legislative decrees of 1 October 1923, n. 2185

Royal legislative decrees of 30 December 1923, n. 3267

School Standards and Framework Act 1988

Special Educational Needs and Disability Act 2001

Universal Declaration of Human Rights, art.27