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DELTA: Digital Excavation through Learning and Training in Archaeology

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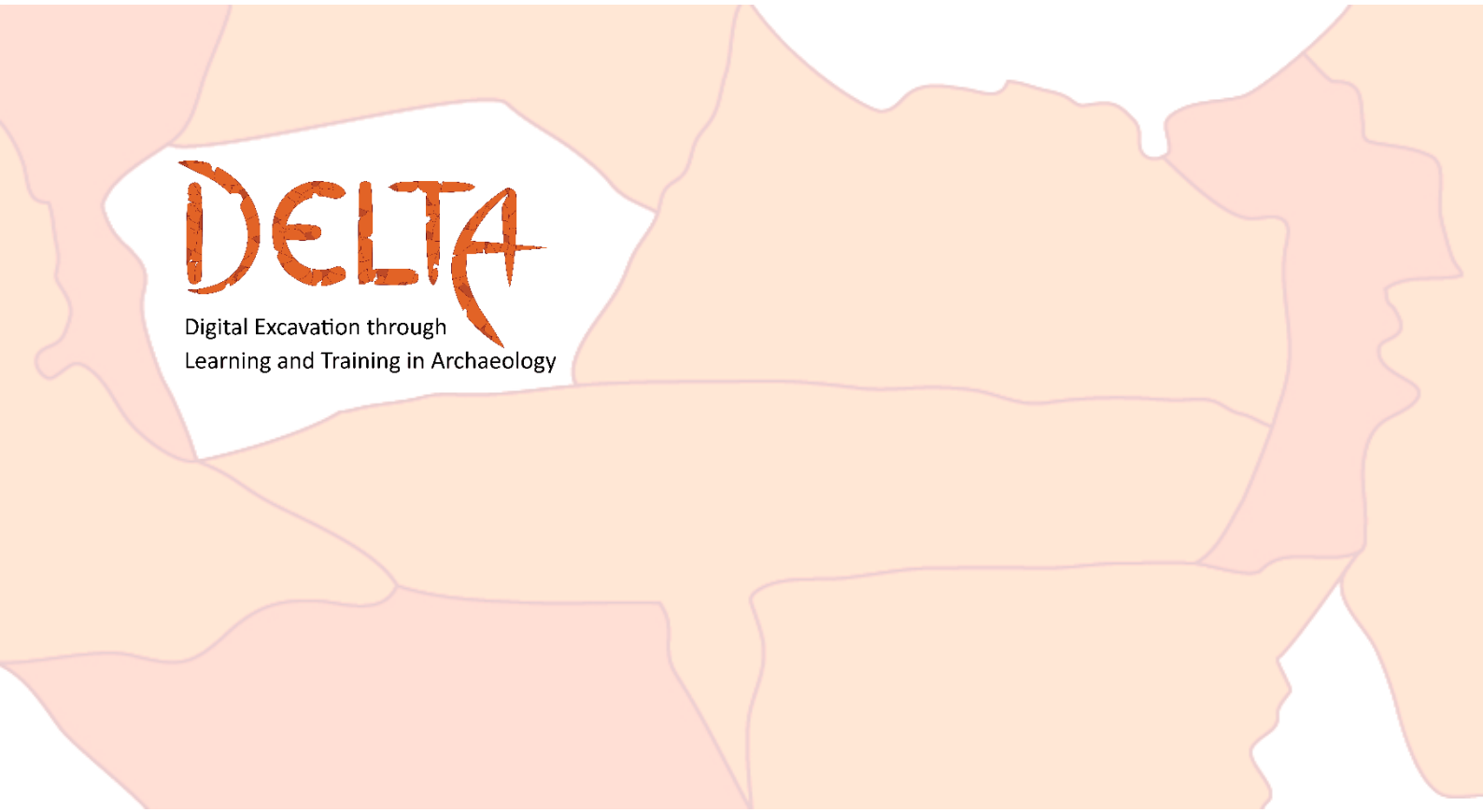

TRAINING STUDENTS IN THE USE OF DIGITAL TECHNOLOGIES IN ARCHAEOLOGY

DESK AND FIELD RESEARCH FINAL REPORT

Co-funded by the Erasmus+ Programme of the European Union

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Abstract:	The Desk and Field Research is part of the preparatory work for the Intellectual Output 1 (IO1), namely for the design of a course on that will train students in the use of digital technologies in Archaeology. Aim of the research was to record, study and analyze: (a) the existing curricula of Archaeology, (b) the application of digital tools in archaeological practice and training, (c) the existing digital skills, and (d) the aspirations of students and professionals of Archaeology regarding the use of digital tools in Archaeology. Two methods were used: (a) the Desk Research, and (b) the Online Questionnaire. The evidence and the analysis of the results are presented in Chapters 2 and 3, while in the concluding Chapter 4, we formulate a set of parameters for the design of the course. It should be noted that such a research has not been undertaken, so far, in any EU country; it is, therefore, an innovative piece of work.
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Abstract

The Desk and Field Research is part of the preparatory work for the Intellectual Output 1 (IO1), the main objective of which is the design and development of a blended course that will train students in the use of digital technologies in Archaeology. The design of this course has to take into account: (a) the existing curricula of Archaeology in archaeological departments at EU level, (b) the application of digital tools in archaeological practice and training, (c) the existing digital skills, and (d) the aspirations of students and professionals of Archaeology regarding the use of digital tools in Archaeology.

For this reason, an extensive Desk and Field Research was undertaken by all partners, in order to record and analyze the available evidence in the three participating countries, and formulate the basic principles for the design of the course. It should be noted that this kind of research has not been undertaken, so far, in any EU country; it is, therefore, innovative.

The Final Report is divided into five chapters. Chapter 1 is introductory, and described the aims used for the Desk and Field Research, and the two methods used: (a) the Desk Research, and (b) the Online Questionnaire. In Chapter 2 the results of the first method, the Desk Research, are presented and discussed. In Chapter 3 the results of the second method, the Online Questionnaire, are presented and discussed. Chapter 4 is a concluding chapter in which the results of the analysis are used in order to formulate a set of parameters for the design of the course. Chapter 5 is the Appendices, containing primary evidence upon which the analysis of Chapters 2 and 3 was based.

1 General introduction: Aims and Methods

1.1 Aims of the Desk and Field Research

DELTA project aims at designing and developing an innovative, open, blended course that combines the physical space of the excavation in the field with the digital space (virtual excavation, online learning) with the aid of new technologies, in order to train students in digital competences and the use of new technologies in Archaeology.

Intellectual Output 1 is the first of the two project outputs, and concerns the design of the course after taking into consideration (a) the skills needed for new archaeologists and (b) the syllabus of training courses that are already available at Archaeological departments. For this reason, before designing the course it was considered essential to carry out an extensive Desk and Field Research with the following aims:

1) To record the existing situation mainly in the three participating countries concerning:

(a) higher education courses on excavation methods and techniques

(b) the use of digital applications in archaeological excavations

(c) the use of digital educational tools in courses about excavation practice

2) To explore, assess and understand the expectations and desires of students and professionals of archaeology concerning the use of digital tools and applications in:

(a) Archaeological excavations

(b) Courses on excavation practices, methods and techniques

1.2 Methods of the Desk and Field Research

To achieve these aims the partners decided to adopt two main methods of research: (a) the Desk Research and the Online Survey, each method having different aims and methods of collecting and interpreting the relevant data.

1.2.1 Desk Research

Aim of the Desk Research was to explore the trends in the curricula of the 3 countries regarding the use of digital tools and applications in excavation and teaching. For this reason a special questionnaire form was composed

and filled by the partners on the basis of the evidence found in the websites of universities and institutions of the three participating countries and other major EU universities.

1.2.2 Online Survey

Aim of the Online Survey was to: (a) explore the existing digital skills and level of expertise of students and professionals in the three participating countries, and (b) identify which digital skills are considered essential for archaeological excavations. For this reason, a special online questionnaire form was composed by the partners, translated in the three national languages (Czech, Greek, Italian) and in English and filled by students and professionals after invitation.

2 Desk Research

2.1 Introduction: Aims and Methodology

Aim of the Desk Research was to explore the trends in the curricula of the three countries regarding the use of digital tools and applications in excavation and teaching.

In January-February 2020 a special questionnaire form was composed in English and filled in by the partners with evidence and data found in the website of universities and institutions.

2.2 The Desk Research Questionnaire

The Desk Research Questionnaire comprised three major groups of data:

Group A. General Institution Data: University/Department, Program of studies, Teaching Methodology, Courses on Archaeology, ECTS, Employment opportunities

Group B. Courses on Field Techniques: Description of course and excavation, Duration, ECTS, digital tools used in excavation

Group C. Digital tools and skills: (a) Digital tools used in the Excavation, (b) Digital skills provided to students

A detailed presentation of the fields included in the Desk Research Questionnaire can be found in Appendix I (Chapter 5.1).

2.3 Presentation and Analysis of the Data

2.3.1 Greece

In Greece there are 9 BA, 17 MA and 9 PhD Programs of Study related to Archaeology, which are offered by 9 different Universities. As expected, this is the case for all 7 Greek Universities which comprise a Department of Archaeology (Universities of Athens, Thessaloniki, Ioannina, Crete, Thessaly, Peloponnese, Aegean). Moreover, courses in Archaeology are also included in 2 Universities which do not have a Department of Archaeology and do not provide a BA in Archaeology. These are the Department of History of the Ionian University, and the Department of History and Ethnology of the University of Thrace.

A. BA Programs of Study (Total number: 9)

All 9 BA Programs have a duration of 8 semesters (4 years) and require 240 ECTS for accreditation. The method of study combines lectures in class, seminars, practicals and visits to archaeological sites and museums, and all are taught in Greek. The basic method of assessment for the overwhelming majority of the courses is written and oral exams, but also essays and presentations.

The percentage of Archaeology courses required for a BA in Archaeology varies between 32% and 43%. The percentage is much lower than in other countries because the Greek BAs in Archaeology include also many courses on History, Philology, Philosophy, Language, Literature and Education, in order to provide the graduates of Archaeology the professional rights to work as teachers of History, Philology, Philosophy, Literature and Greek Language in secondary schools. The percentage of ECTS required for a BA in Archaeology is higher, varying between 35% and 54%, but still is much lower than in other countries for reasons explained above.

All curricula provide also the opportunity for an internship in Institutions related to Archaeology, such as the Greek Archaeological Service, Museums, Research Institutes and Cultural Organizations.

The employment opportunities related to Archaeology include the Greek Archaeological Service, Research Institutes, Museums, Secondary and Higher Education, Tour-guides in archaeological sites and museums.

Each of the 7 curricula comprises one course on excavation and field techniques. In 6 of them it is a compulsory course; in a single exception (AUoThessaloniki) it is optional, but recommended. The ECTS provided for this course varies between 4 and 10.

In all 7 courses on excavation and field techniques there is a compulsory practice in one excavation or field project. In 6 courses, the practice takes

place in the departmental excavations, during the summer, after the completion of the semester. The only exception is the NKUoAthens, where students have to practice in a specific excavation, the Departmental Excavation at Plasi Marathon, which takes place every May, during the spring semester. When information is provided, the number of days of practice varies between 10 to 30 days.

Concerning the use of digital tools in the excavation, information is provided in 5 cases. The digital applications include (1) Digital Notebooks composed in situ and after the excavation, (2) use of Drone, (3) Digital Photos, (4) Digital Drawings, (5) Photogrammetry, (6) 3D graphics, (7) Virtual Reconstruction and (8) GIS.

Also in 4 out of 7 excavation courses, digital applications cover all 4 modules of DELTA.

B. MA Programs of Study (Total number: 17)

All MA Programs have duration of 4 semesters (2 years) and require 120 ECTS for accreditation. In Greece there is no MA Program focusing exclusively on excavation and field techniques. As a result, there are no compulsory courses on excavation and field techniques, with two exceptions.

The first is the "MSc in Cultural Heritage Materials and Technologies" of the University of Peloponnese, which comprises two courses providing 7.5 ECTS each. They include teaching of digital applications: GIS, UAV for Cultural Heritage, Monitoring Cultural Heritage from Space, Reconstructing Archaeological Objects and Sites, Statistical Evaluation of Analytical Data, and Designing Multimedia Applications.

The second is the "MA in Interdisciplinary Approaches in Historical, Archaeological and Anthropological Studies" of the University of Thessaly, which comprise a course on Surface Survey and Landscape Archaeology with 15 ECTS. The course includes familiarization with GIS.

However, none of these courses includes compulsory practice in the field.

C. PhD Programs of Study (Total number: 9)

In Greece there is no PhD Program focusing exclusively on excavation and field techniques. As a result, there are no compulsory courses on excavation and field techniques.

2.3.2 Czech Republic

In the Czech Republic there are 21 BA, 15 MA and 8 PhD Programs of Study related to Archaeology, which are offered by 7 different universities (Brno, České Budějovice, Hradec Kralové, Olomouc, Opava, Pilsen, Prague). All these programs are offered by Departments or Institutes of Archaeology in those universities.

A. BA Programs of Study (Total number: 21)

Of the 21 BA Programs 18 have a duration of 6 semesters (3 years) and require between 67 and 180 ECTS for accreditation, while 3 have a duration of 4 semesters (2 years) and require 180 ECTS for accreditation. The method of study combines lectures in class, seminars and practicals. 10 are taught in English and Czech, and 11 in Czech. The methods of assessment include exams, essays and theses.

The percentage of Archaeology courses and ECTS required for a BA in Archaeology is 100%.

All curricula also provide the opportunity for internship in National Institutions related to Archaeology, such as Cultural Heritage Organizations, Museums and Research Institutes.

The employment opportunities of the graduates of Archaeology include jobs in the Academia (University Departments and Institutes of Archaeology), the National Academy of Science, Museums, and Cultural Heritage Organizations.

A group of 5 BA Programs in Archaeology (4 in Brno, 1 in Hradec Králové) offer a relatively large number of courses on Field Techniques (4-5), and require at least 4 courses for accreditation (16-19 ECTS). Another group of 9 BA Programs in Archaeology and Classical Archaeology (2 in Brno, 2 in České Budějovice, 2 in Opava, 1 in Olomouc and 2 in Prague) offer and require less courses on Field Techniques (1-3) for accreditation (6-12 ECTS). Finally 7 BA Programs, mostly in Museology, do not require any course on Field Techniques for accreditation.

All the 19 BA courses on Excavation Techniques include compulsory practice in excavation or in the field. In most courses the duration is between 5 and 15 days, while in the Summer Practice of Brno it is 20-30.

In all excavations it is reported the use of digital tools in the excavation practice, including Database, Photogrammetry and GIS. Students are trained to all those skills, as well.

In all courses digital applications cover Modules 1 and 2 of DELTA, with the exception of the course "Practice of archaeological excavation III" in Brno, which covers Modules 1, 2 and 3, and "Practice of archaeological excavation IV" in Brno, which covers all 4 modules of DELTA.

B. MA Programs of Study (Total number: 15)

In the Czech Republic there is no MA Program focusing exclusively on excavation and field techniques. All 15 MA Programs have a duration of 4 semesters (2 years) and require between 50 and 120 ECTS for accreditation.

The 5 MA Programs in Archaeology require the participation in 1 course (3-8 ECTS) on Excavation techniques, while those in Museology and Classical Archaeology do not have such requirement.

All these courses on Excavation Techniques include compulsory practice in the field for 10-20 days. In all excavations it is reported the use of digital tools in the excavation practice, including Database, Photogrammetry and GIS. Students are trained to all those skills, as well.

All the courses cover Modules 1 and 2 of DELTA.

C. PhD Programs of Study (Total number: 8)

In the Czech Republic there is no PhD Program of Studies focusing exclusively on excavation and field techniques. As a result, there are no compulsory courses on excavation and field techniques. There is only one optional course in the PhD Program of the University of Hradec Králové.

2.3.3 Italy (Centre and South)

Due to its size and long academic tradition in archaeology, Italy has a large number of universities offering programs of study on Archaeology and relevant disciplines. For this reason it was decided to search, record and analyze the current state picture only in the central and south part of the country, where the partner of the project (UNIBAS) is based, as well as the three major universities of the Italian capital, Rome.

In central and south Italy there are 21 BA, 26 MA, 8 Specialization and 17 PhD Programs of Study related to Archaeology, which are offered by 22 different Universities (Bari, Basilicata, Cagliari, Calabria, Catania, Chieti, Foggia, L'Aquila, Lecce, Macerata, Messina, Molise, Napoli-Benincasa, Napoli-Federico II, Napoli-L'Orientale, Napoli-Vanvitelli, Palermo, Roma-La Sapienza, Roma-Tre, Roma-Tor Vergata, Sassari, Urbino). The departments

offering these courses vary considerably, comprising Departments of Humanities, Classics, Letters, Literature, Arts, Social Sciences, Tourism, Education, History, Cultural Heritage and Human Sciences.

A. BA Programs of Study (Total number: 21)

All BA Programs have a duration of 6 semesters (3 years) and require 180 ECTS for accreditation. The method of study combines face-to-face lectures in classes, seminars, practicals and e-learning distant methods, including MOOCs. All BA Programs are taught in Italian. The methods of assessment include written and oral exams, essays, a thesis and practical exercises.

The percentage of Archaeology courses and ECTS required for a BA in Archaeology varies considerably between 15% and 55%, the average being around 30%.

All curricula provide also the opportunity for internship in Superintendencies, Archaeological Parks, Museums, Archives, Libraries, Organizations operating in the field of protection, conservation and enhancement of cultural heritage.

The employment opportunities related to Archaeology include jobs as Archaeologist, Art historian; Researcher; Professor; Expert in conservation and enhancement of cultural heritage.

Most BA Programs in Archaeology (19 out of 21) offer courses on excavation and field techniques, and require at least 1-4 courses for accreditation. These courses correspond to 3-24 ECTS, with the average being around 6 to 12 ECTS.

Evidence for courses on Excavation Techniques are very few, deriving only from 4 BA programs. All include practice in excavation, the duration of which varies between 5 and 10 days.

The use of digital tools is reported in all excavation courses. The digital tools include Digital notebooks, Digital cards, use of Drone, Digital photos, Digital drawings, Photogrammetry, 3D graphics and GIS. Students are trained to all those skills, as well.

In all excavation courses digital applications cover all 4 modules of DELTA.

B. MA Programs of Study (Lauree magistrali) (Total number: 26)

In central and south Italy there is no MA Program focusing exclusively on excavation and field techniques. Most programs have a duration of 4 semesters (2 years) and require 120 ECTS for accreditation.

Unfortunately, concerning excavation and field techniques courses, it was possible to find and record details for only 3 MA programs. The only compulsory course is in the University of Basilicata, while the other two are optional. These courses provide between 3-6 ECTS, and may include practice in excavation, with a duration of 15-21 days.

The use of digital tools is reported for two of the courses, and include Digital notebooks, Digital cards, Drone, Digital photos, Digital drawings, Photogrammetry, 3D graphics and GIS. Digital skills are provided to the students as well.

In the two recorded courses on excavation and field techniques, digital applications cover all 4 modules of DELTA.

C. Post-graduate Specialization School in Archaeology (Total number: 8)

In the Italian educational system, after the MA Degree (Lauree magistrali), it is possible to apply and follow the post-graduate School of Specialization in Archaeology (IIIrd cycle, limited number of students), providing a Diploma of Specialization in Archaeology. These post-graduate courses tend to be more focused on a specific subject within the archaeological disciplines, and aim at training specialists and offering the necessary professional skills.

A number of 8 School of Specialization in Archaeology were recorded, all focusing on Archaeological and/or Cultural Heritage. All programs have a duration of 4 semesters (2 years) and require 120 ECTS for accreditation.

Unfortunately, concerning excavation and field techniques courses, it was possible to find and record details for only 1 School of Specialization in Archaeology, in the University of Basilicata. This program includes one course on excavation and field techniques. The course is compulsory, it provides 5 ECTS, and includes practice in excavation, with a duration of 21 days per year (20 ECTS).

The use of digital tools is reported, and include Digital notebooks, Digital cards, Drone, Digital photos, Digital drawings, Photogrammetry, 3D graphics and GIS. Digital skills are provided to the students as well.

The digital applications applied in this course cover all 4 modules of DELTA.

D. PhD Programs of Study (IIIrd cycle) (Total number: 17)

In Italy there is no PhD Program of Studies focusing exclusively on excavation and field techniques. As a result, there are no compulsory courses on excavation and field techniques.

2.4 Discussion of the Data

The comparative analysis of the data allows some interesting observations concerning the archaeological curricula of the three countries.

The number of Departments is comparable among the three countries. Greece and the Czech Republic, with an almost identical population of 10.6 million, have comparable numbers of Departments and Programs of Study related to Archaeology. The same is the case for the southern part of Italy, which, with a population of c. 20 million, has 2 times more Departments and Programs that the other two countries. In all three countries there seems to be a rough analogy of 1 Department and 1 BA Program per 1 million people.

A point of divergence can be seen in the Czech Republic, where the larger number of BA Programs is double the number of the Departments. This implies a different, more flexible strategy of the Czech Academia to offer more than one BA Program per Department.

	Greece	Czech Republic	Italy (South)
Departments	9	7	22
BA Programs	9	21	21
MA Programs	17	15	26
School of Specialization	-	-	8
PhD	9	8	17

Table 1. Departments and Programs of Study related to Archaeology in the three participating countries

Furthermore, the Czech Republic differs significantly from Greece and Italy in the percentage of archaeology courses as part of the curriculum. In Greece the percentage of archaeology courses is c. 35-40%, in Italy is c. 30%, while in the Czech Republic it is 100%. This major point of difference clearly suggests that BA studies in the Czech Republic are almost exclusively focused on archaeology. In contrast, in Greece and Italy, archaeology courses are just part of a broader curriculum, which also includes courses on Literature, History and Classics. This is also reflected by the fact that BA Programs in these two countries are not offered by pure Departments of Archaeology; in Greece they are offered by Departments of History and Archaeology and in Italy by Departments which in their title include disciplines such as Humanities, Classics, Letters, Literature, Arts, Social

Sciences, Tourism, Education, History, Cultural Heritage and Human Sciences.

BA Programs	Greece	Czech Republic	Italy (South)
Duration (semesters)	8	6	6
ECTS	240	180	180
Archaeology courses (% of total)	32-43%	100%	av. 30%
Archaeology ECTS (% of total)	35-54%	100%	av. 30%

Table 2. BA Programs in the three participating countries

The strict focus of the Czech curricula on archaeology is also observed in the number of courses on Excavation Techniques. First, it should be emphasized that in all three countries there is a certain number of courses on Excavation Techniques, which include compulsory practice in excavations. However, students in the Czech Republic have to follow more courses on Excavation Techniques, and to spend more days practicing in the field, as part of their curriculum.

It is also important to note that the use of digital tools is the norm in all excavations, and that the students are trained in the use of these digital tools.

BA Programs	Greece	Czech Republic	Italy (South)
Course on Excavation Techniques	1 pp	2-3 & 4-5 pp	1-2 pp
Compulsory practice in excavation	Y	Y	Y
Days of practice	10-21	10-15, 20-30	12-21
Use of digital tools in excavation	Y	Y	Y
Training in the use of digital tools	Y	Y	Y

Table 3. Courses and Practical Training in Excavation Techniques in the BA Programs of the three participating countries (pp: per program)

The picture is the same for the MA Programs, with the exception of Greece, where no courses on Excavation Techniques is offered as part of the curriculum.

MA Programs	Greece	Czech Republic	Italy (South)
Course on Excavation Techniques	-	1 pp	1 pp
Compulsory practice in excavation	N	Y	Y
Days of practice	-	10-15, 20-30	12-21
Use of digital tools in excavation	Y	Y	Y

Training in the use of digital tools	Y	Y	Y

Table 4. Courses and Practical Training in Excavation Techniques in the MA Programs of the three participating countries

Finally, the same digital tools are reported as used in excavation training in all three countries; these tools include: Digital Notebooks and/or Cards, Use of Databases, Photogrammetry, 3d Graphics & Virtual Reconstruction, GIS, and the use of GPS and other topographic instruments.

3 Online Questionnaire

3.1 Introduction: aims and methodology

Aim of the Online Survey was to: (a) explore the existing digital skills and level of expertise of students and professionals in the three participating countries, and (b) identify which digital skills are considered essential for archaeological excavations.

In January-February 2020 a special questionnaire form was composed in English and translated by the partners in the three national languages (Czech, Greek and Italian). The questionnaire was transferred into Google Forms format and uploaded online in the Google Forms platform. A special invitation was sent via email to students, colleagues and professionals of archaeology and related subjects, providing the necessary information about the project, the link to the project website, and the link to the questionnaire.

The deadline for filling the questionnaire was between 24 February and 13 March 2020. A preliminary processing and interpretation of the collected data was made in March 2020 and it was presented and discussed by the partners in the first transnational meeting of the project, which was organized by Masaryk University in 9-10 April 2020.

3.2 The Online Questionnaire

The Online Questionnaire was anonymous, and the questioned person was kindly asked, but not obliged to, provide an email for future information and dissemination purposes. The questionnaire comprised four major categories of questions:

Part A. General personal data: Current specialization and position, Affiliation, Country, Gender, Age. Educational Level

Part B. Training in digital excavation methods and techniques: (a) BA courses which include excavation training in their curricula, (b) digital applications used in excavation practice, (c) digital educational tools used in excavation training

Part C. Professional experience in digital excavation methods and techniques: (a) professional experience in excavations, (b) Digital applications used in these excavations

Part D. Digital skills/competences/tools which are considered essential/important: (a) digital skills considered essential for an excavation project, (b) digital educational tools considered important for a training course, (c) previous experience in Massive Open Online Course (MOOC).

A detailed presentation of the questions included in the Desk Research Questionnaire can be found in Appendix II (Chapter 5.2).

3.3 Presentation and Analysis of the Data

In this section we will present and discuss the data deriving from the four major part of the questionnaire

3.3.1 PART A: General Personal Data

A total number of 245 responses were collected through online survey, which are distributed as follows: Greece: 119, Italy: 70, Czech Republic: 56. In the following section we present and discuss shortly the relevant data, which provide the professional and academic profile of the responders.

Current Specialization: as expected, the overwhelming majority (97%) of the responders are archaeologists. The few exceptions include a few historians from Greece (2%), museologists from the Czech Republic (1%), and single cases of teacher, architect and conservator.

	Current Specialization (N)					Current Specialization (%)			
	GR	IT	CZ	Total		GR	IT	CZ	Total
Archaeologists	115	68	54	237		97	97	96	97
Historians	4			4		3	0	0	2
Teachers		1		1		0	1	0	0
Architects		1		1		0	1	0	0
Museologists			2	2		0	0	4	1

Total	119	70	56	245		100	100	100	100

Table 5. Responses on the basis of Current Specialization

Current Position: all categories are well represented in all three countries. Overall, all categories are represented in percentages between 12% and 17%, while the smallest category is professionals in the Private Sector (9%). Some particularities can be seen in each country. In Greece there is an over-representation of BA students (29%), in Italy an over-representation of professionals from the Private Sector (20%), and in the Czech Republic an over-representation of PhD students (23%). Also, in Italy there is a large category of Postgraduate Students of Specialization in Archaeology, which comprise 17% of the Italian responders, and 5% of the total.

	Current Position (N)					Current Position (%)			
	GR	IT	CZ	Total		GR	IT	CZ	Total
Public Sector	9	12	8	29		8	17	14	12
Private Sector	6	14	1	21		5	20	2	9
University Prof	18	2	9	29		15	3	16	12
BA Students	35	5	2	42		29	7	4	17
MA Students	17	12	10	39		14	17	18	16
Specialization Students[1]		12		12		0	17	0	5
PhD Students	17	7	13	37		14	10	23	15
Researchers	15	5	10	30		13	7	18	12
Graduates	2	1	3	6		2	1	5	2
Total	119	70	56	245		100	100	100	100

Table 6. Responses on the basis of Current Position

[1] Schools of Specialization are found only in Italy, where, after the MA Degree, it is possible to apply and follow the post-graduate School of Specialization in Archaeology (3rd cycle, limited number of students), providing a Diploma of Specialization in Archaeology.

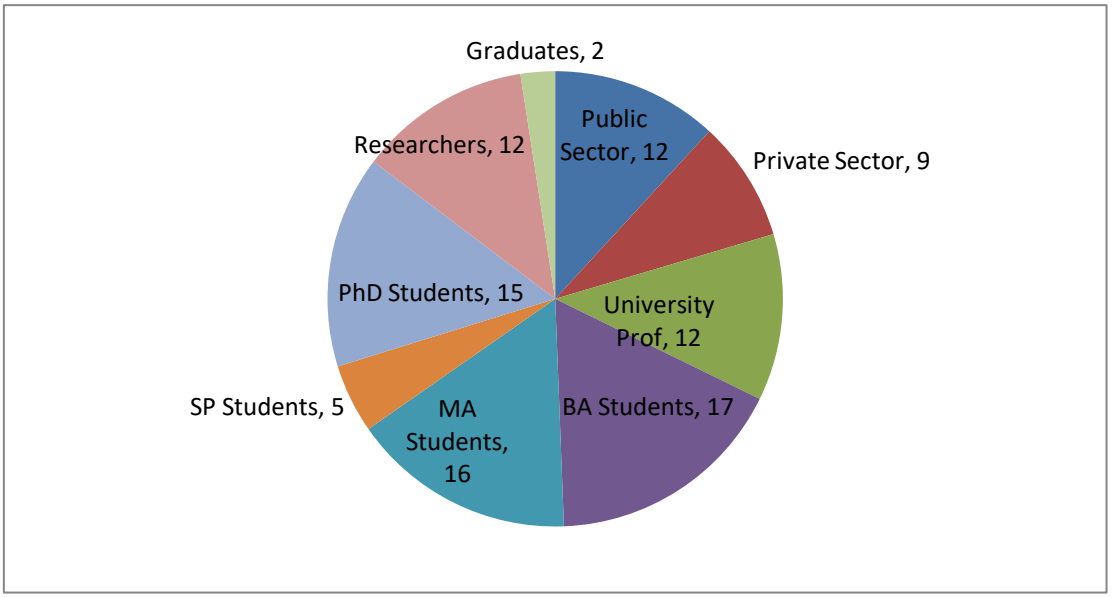

Figure 1. Chart showing the responses on the basis of Current Position (in %)

Organization/Affiliation: as expected, the overwhelming majority of the responders have some short of academic (University) affiliation (78%), while the rest of the categories (Research Center, Public Service, Private Sector, Museum) are represented by less than 8% each. Some divergence from the overall picture is seen in the Czech questionnaire, where University affiliation is significantly smaller (52%), while affiliation with Researcher Centers and Public Sector is over-represented (20% and 13% respectively).

	Affiliation (N)					Affiliation (%)			
	GR	IT	CZ	Total		GR	IT	CZ	Total
University	103	60	29	192		87	86	52	78
Research Center	4	1	11	16		3	1	20	7
Public Service	9	4	7	20		8	6	13	8
Private Company	3	4	5	12		3	6	9	5
Museum		1	4	5			1	7	2
Total	119	70	56	245		100	100	100	100

Table 7. Responses on the basis of Affiliation

Country of residence: as expected, most of the responders reside in Greece (44%), Italy (28%) and the Czech Republic (22%). There are also 1-4 cases residing in the UK, Netherlands, USA, Slovakia, Cyprus, Germany, Spain and Russia.

Gender: in Greece and Italy 2/3 of the responders are females (66%-69%), while in the Czech Republic females are only 45%. Overall, the majority of the responders (62%) are females, and only 36% are males.

	Gender (N)					Gender(%)			
	GR	IT	CZ	Total		GR	IT	CZ	Total
Male	36	24	28	88		30	34	50	36
Female	82	46	25	153		69	66	45	62
NA	1		3	4		1	0	4	2
Total	119	70	56	245		100	100	100	100

Table 8. Responses on the basis of Gender

Age: the majority of the responders (50%) belong to the youngest age category (18-30 y), and there is a gradual fall as moving to older ages: 22% in the 30-40 age category, 18% in the 40-50, 7% in the 50-60 and 2% in the 60-70.

	Affiliation (N)					Affiliation (%)			
	GR	IT	CZ	Total		GR	IT	CZ	Total
18-30	64	36	23	123		54	51	41	50
30-40	19	15	20	54		16	21	36	22
40-50	24	9	11	44		20	13	20	18
50-60	8	9	1	18		7	13	2	7
60-70	4	1	1	6		3	1	2	2
70+				0		0	0	0	0
Total	119	70	56	245		100	100	100	100

Table 9. Responses on the basis of Age

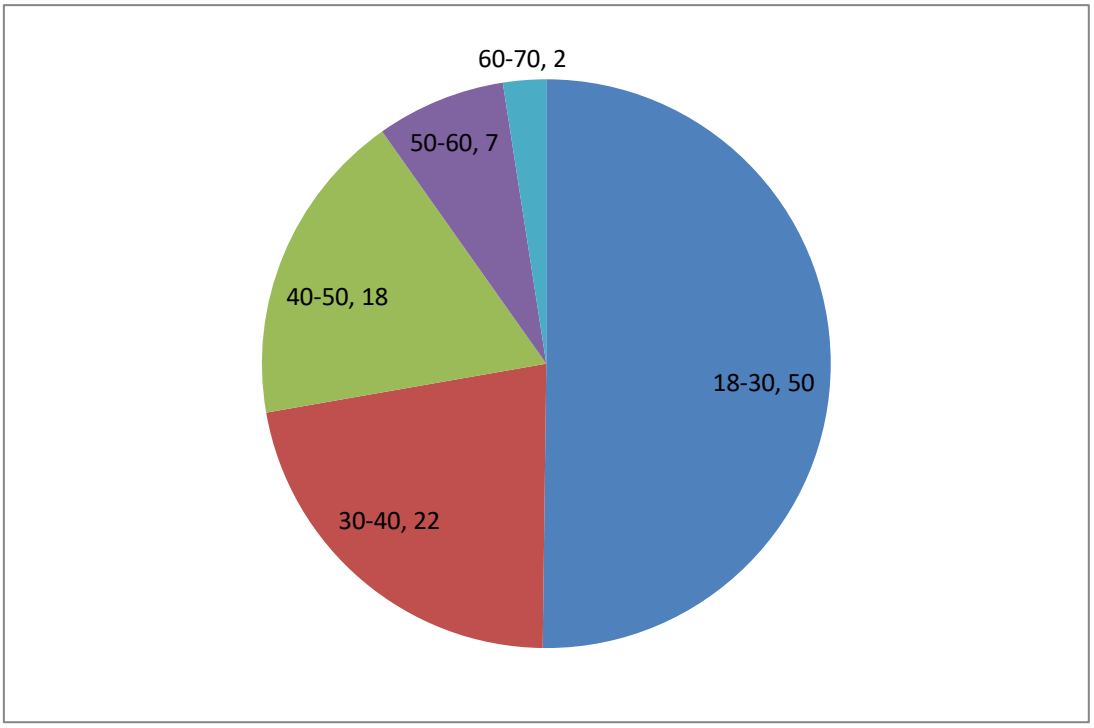

Figure 2. Chart showing the responses on the basis of Age

Educational Level: the overwhelming majority of the responders has an advanced educational level, most of them holding either an MA degree (27%, including graduates with MA), and/or a Specialization or PhD (36%). Only 20% have only a BA, and 18% are currently students without BA. There are no significant differences between the three countries, apart from over-representation of BA students (29%) in the Greek questionnaire and under-representation of PhD holders (16%) in the Italian questionnaire.

	Educational Level (N)					Educational Level (%)			
	GR	IT	CZ	Total		GR	IT	CZ	Total
BA students	35	5	3	43		29	7	5	18
BA	21	14	13	48		18	20	23	20
MA	25	18	23	66		21	26	41	27
PhD	38	11	17	66		32	16	30	27
Specialization		22		22		0	31	0	9
Total	119	70	56	245		100	100	100	100

Table 10. Responses on the basis of Educational Level

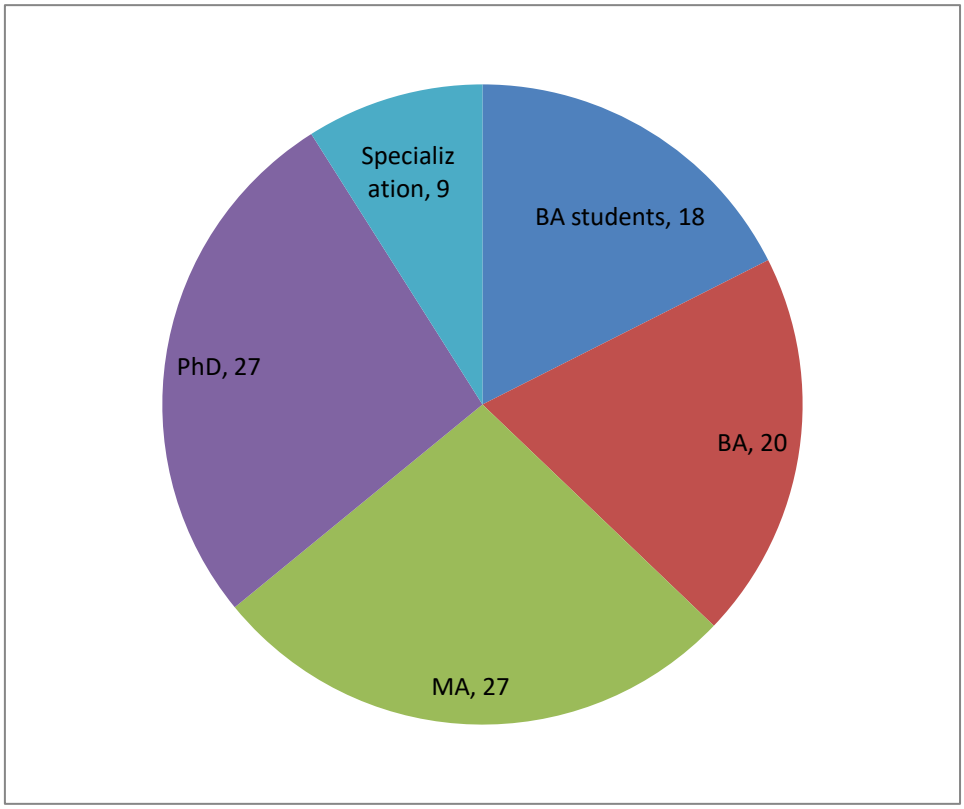

Figure 3. Chart showing the responses on the basis of Educational Level

Discussion: Despite the anonymity of the questionnaire, the statistical analysis of General Personal Data shows that the sample is representative and it may provide really useful information concerning the questions included in the questionnaire. First, it is important to emphasize that almost all the responders are directly related to archaeology. Second, all age, gender, position, affiliation and educational categories are represented in the sample, but some interesting observation can be made. Regarding gender, the over-representation of females is actually representing the real situation in the academia and labour market, particularly in Greece and Italy. Regarding age and affiliation, the over-representation of lower age categories (>40 years) and responders affiliated to universities, was a conscious decision, because the target of the DELTA project is students and the younger generations of current and future archaeologists. The above mean that the answers provided by the responders closely reflect and represent the opinions, ideas, expectations and aspirations of a wide variety of people studying and working in archaeology, in all three countries.

3.3.2 PART B: Training in Digital Excavation Methods and Techniques during BA Studies

Courses in excavation methods and techniques during studies: About three quarters of the responders (76%) followed, during their BA

studies, courses which included training in excavation methods and practices. The percentages are comparable in all three countries, showing that in all partners there is a good background of excavation training in most students of archaeology and in all the relevant university curricula.

	Courses in Excavation Methods (N)				Courses in Excavation Methods (%)			
	GR	IT	CZ	Total	GR	IT	CZ	Total
BA students	35	5	3	43	29	7	5	18
BA	21	14	13	48	18	20	23	20
MA	25	18	23	66	21	26	41	27
PhD	38	11	17	66	32	16	30	27
Specialization		22		22	0	31	0	9
Total	119	70	56	245	100	100	100	100

Table 11. Courses in Excavation Methods and Techniques during studies

Digital tools used in the excavation: On the other hand, it is important to emphasize that from these courses only one third (34%) included training in digital applications during the excavation. This means that digital skills have not yet been systematically incorporated in the excavation training courses. It should be, also, noted, that there are sharp differences between the three countries in this respect; in the Greek questionnaire the percentage is only 17%, in the Italian 39% and the Czech 59%. This shows sharp differences in the curricula of the three countries, concerning training in digital applications in excavations. In the Greek case alone, training in digital applications was included in the curricula only 5 years ago, and, therefore, the low percentage is, by no means, surprising.

	Digital Tools in the Excavation (N)				Digital Tools in the Excavation (%)			
	GR	IT	CZ	Total	GR	IT	CZ	Total
Yes	14	22	27	63	17	39	59	34
No	70	35	19	124	83	61	33	66
Total	84	57	46	187	100	100	100	100

Table 12. Digital Tools used in courses on Excavation Methods and Techniques

As expected, higher percentages of training in digital applications is seen in the two lower age categories (18-30: 25%; 30-40: 35%), while in the higher ones the percentage is much lower (40-50: 20%; 50+: 17%). The following table summarizes the frequency of various digital applications

included in excavation training courses. Each number in the following table represents the percentage (%) of the responses that each digital tool received against the total responses from each country (GR, IT, CZ) and against the total number of responses (Total):

	GR	IT	CZ	Total
Notebooks composed in the field	64	14	22	29
Cards composed in the field	29	59	33	41
Notebooks composed after excavation	57	32	70	54
Cards composed after excavation	14	73	22	38
Digital Photos	79	73	81	78
Digital Drawings	50	55	33	44
Photogrammetry	79	45	52	56
3D graphics	57	27	19	30
Digital presentation of monuments & artifacts	7	18	11	13
Dissemination of excavation results to the public	7	55	26	32
Digital Exhibition	0	5	0	2
Digitization of collections and archives	7	27	0	11
Managing digital archives and/or collections	0	23	22	17
Audience engagement	14	32	7	17
Communication	7	27	19	19
Storytelling	7	5	7	6
Development of digital applications	0	5	0	2
Use of laser scanners	0	5	0	2
Use of Autocad	0	5	0	2
Use of GIS applications	0	0	4	2
Use of topographical instruments	0	0	4	2

Table 13. Frequency of digital tools included in excavation training courses (in %)

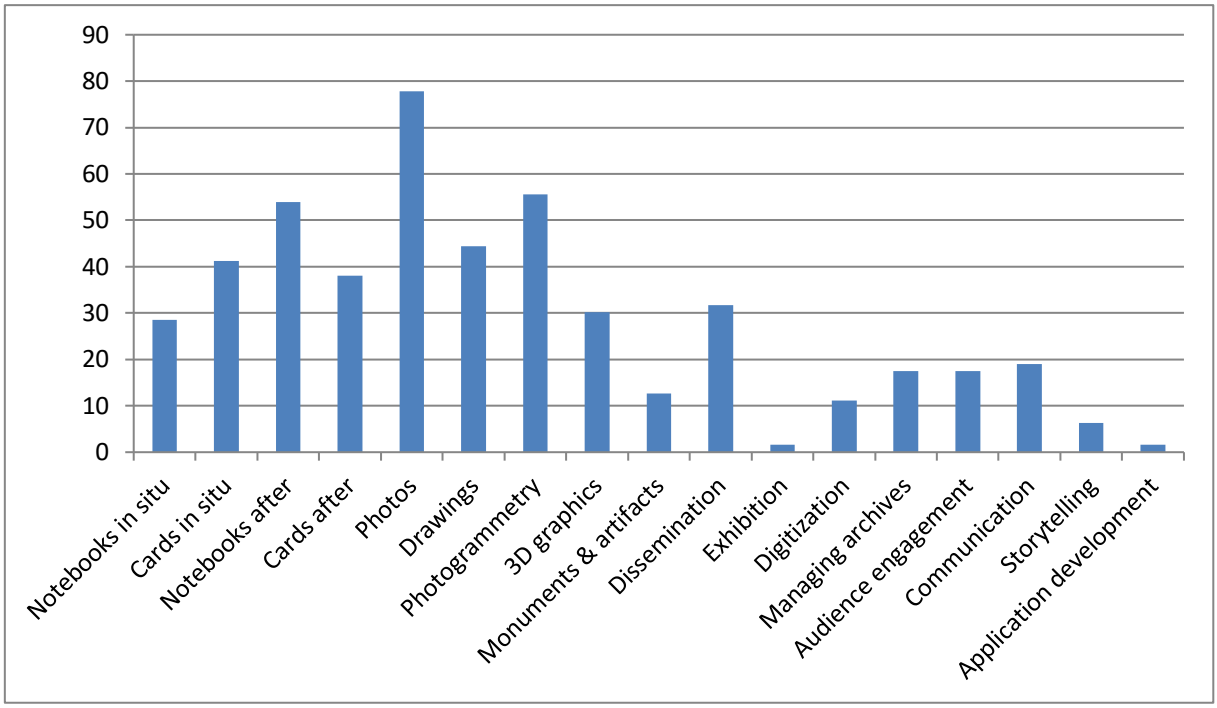

Figure 4. Chart showing the frequency of digital tools in excavation training courses (values are based on Table 13)

As expected the most frequent is Digital Photos (78%), followed by a group of relatively frequent applications such as Photogrammetry (56%), Notebooks filled at the office after the excavation (54%), Digital Drawings (44%) and Cards filled in situ (41%) and at the office after the excavation (38%). Less frequent are applications such as Dissemination (32%), 3D Graphics (30%), Notebooks in situ (29%). Rather rare are digital applications related to Communication (19%), Managing of Digital Archives (17%), Audience Engagement (17%), Digital Presentation of Monuments and Artifacts (13%) and Digitization of Collections and Archives (11%). Finally, extremely rare or absent are applications related to Storytelling (6%), Application Development (2%), Exhibitions (2%), GIS (2%), Total Station, Laser Scanner, DGPS and Topography (2%).

Major deviations from average in the three countries are the following:

In the Greek sample high frequency is observed in Notebooks in situ (64%) and Photogrammetry-3D Graphics (79%), and low frequency in applications related to Communication (7%), Audience Engagement (14%) and Dissemination of Excavation Results (7%). In the Italian sample it is clear that Cards are more preferable than Notebooks and there is a high percentage in applications related to Communication (27%), Audience Engagement (32%) and Dissemination of Excavation Results (55%). In the Czech sample Notebooks composed at the office, after the excavation are more preferable than Notebooks and Cards filled in situ, while in all other applications the frequency is very close to the average. The above reflect

differences in the digital applications applied in the university excavations of the three countries, and should be taken into account in the designing of the digital course of Intellectual Output 1.

Digital educational tools used in excavation courses: in all three countries the percentage of excavation courses taught with digital educational tools is very small, only 12%. As before, there are major discrepancies between the three countries: digital educational tools in excavation courses are particularly rare in the Greek sample (1%), and more frequent in the Italian (18%) and the Czech (26%) samples, but still relatively small in comparison to the total.

	Digital Educational Tools (N)				Digital Educational Tools (%)			
	GR	IT	CZ	Total	GR	IT	CZ	Total
Yes	1	10	12	23	1	18	26	12
No	83	47	34	164	99	82	74	88
Total	84	57	46	187	100	100	100	100

Table 14. Digital Tools used in courses on Excavation Methods and Techniques

Concerning the types of digital educational tools the small numbers do not allow safe statistical conclusions, but it is clear that by far the prevailing tool is E-learning (70%), followed by Webinars (13%) and MOOC (9%).

	Digital Educational Tools(N)				Digital Educational Tools (%)			
	GR	IT	CZ	Total	GR	IT	CZ	Total
Webinar	1	1	1	3	100	10	8	13
E-learning		6	10	16	0	60	83	70
MOOC		2		2	0	20	0	9
Computer Lab		1		1	0	10	0	4
Nobyly			1	1	0	0	8	4
Total	1	10	12	23	100	100	100	100

Table 15. Frequency of types of Digital Tools used in courses on Excavation Methods and Techniques

Discussion: The overall conclusion emerging from the answers of Part B is that, despite the high frequency of excavation training courses in all university curricula, and the high percentage of archaeologists with relevant training during their BA studies, the use of digital tools is rather limited as part of both the excavation and the education methodology. It seems beyond doubt that there are certain digital deficiencies in the excavation training in all three countries. These deficiencies affirm the need for the

creation of a digital course for excavation training (Intellectual Output 1), and should be taken seriously into account for the design of this course.

3.3.3 PART C: Professional Experience in Digital Excavation Methods and Techniques

Participation in excavations after the completion of undergraduate studies: About two third of the responders (68%) participated in excavations after their undergraduate studies. The percentages are comparable in all three countries, with the highest percentage seen in the Italian sample (74%). This means that the answers provided in the following questions are representative of the conditions in non-university excavations (rescue of systematic) in the three countries.

	Professional Excavation Experience (N)				Professional Excavation Experience (%)			
	GR	IT	CZ	Total	GR	IT	CZ	Total
Yes	1	10	12	23	1	18	26	12
No	83	47	34	164	99	82	74	88
Total	84	57	46	187	100	100	100	100

Table 16. Excavation experience after the completion of undergraduate studies

Almost three quarters of these excavations (74%) use digital applications as part of their excavation methodology. This is surprising, because it comes in contrast with the significant lower percentage of university excavations with training in digital excavation applications (34%). It seems that excavation training in Universities has not yet included digital advances that characterize systematic excavations outside the university curricula.

On the other hand, it should be noted that there is some degree of divergence between the three countries. In the Greek sample the percentage is 65%, in the Italian 77% and in the Czech 89%. These differences may be representative of the situation in the three countries, particularly the relatively slower adoption of digital techniques in Greek excavations. Whatever the case, it seems clear that in all three countries excavations have started to adapt to the digital age faster than the university training excavations.

The following table summarizes the percentages of frequency of the various digital applications which are used in excavations. Each number in the following table represents the percentage (%) of the responses that each digital tool received against the total responses from each country (GR, IT, CZ) and against the total number of responses (Total):

	GR	IT	CZ	Total
Notebooks composed in the field	42	23	55	39
Cards composed in the field	36	55	67	50
Notebooks composed after excavation	70	45	94	68
Cards composed after excavation	42	63	58	53
Digital Photos	98	90	97	95
Digital Drawings	62	78	70	69
Photogrammetry	72	70	79	73
3D graphics	42	25	70	44
Digital presentation of monuments & artifacts	22	30	55	33
Dissemination of excavation results to the public	58	53	64	58
Digital Exhibitions	4	8	15	8
Digitization of collections and archives	24	28	45	31
Managing digital archives and/or collections	22	20	30	24
Audience engagement	24	55	27	35
Communication	26	58	36	39
Storytelling	8	25	9	14
Development of digital applications	18	5	21	15
Hardware for digitizing drawing	0	0	3	1
Use of GIS applications	2	0	6	2
Use of topographical instruments	4	3	3	4

Table 17. Frequency of digital tools used in excavations (in %)

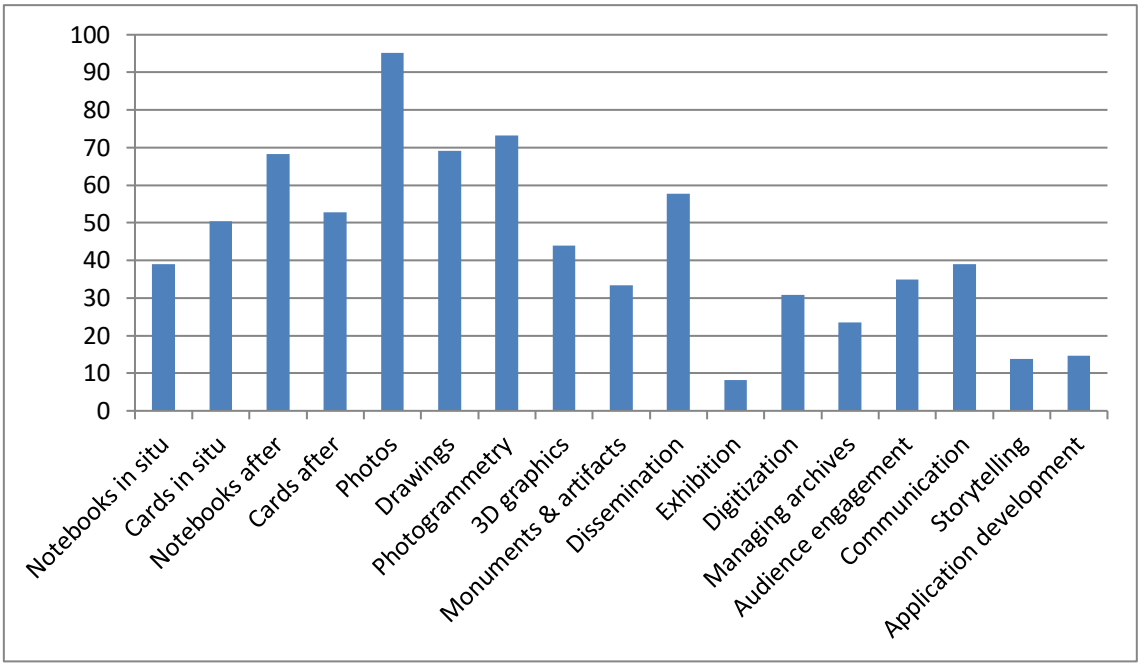

Figure 5. Chart showing the frequency of digital tools used in excavations (values are based on Table 17)

As expected the most frequent digital tool is Digital Photos (95%), followed by a group of very frequent applications such as Photogrammetry (73%), Digital Drawings (69%) and Notebooks composed after excavation (68%). Less frequent applications are Dissemination (58%), Cards filled in situ (53%) and after excavation (50%), and 3D Graphics (44%). A less frequent group of digital applications includes Notebooks composed in situ (39%), Communication (39%), Audience Engagement (35%), Digital Presentation of Monuments and Artifacts (33%) and Digitization of Collections and Archives (31%) and Managing of Digital Archives (24%). Finally, extremely rare or absent are applications related to Application Development (15%), Storytelling (14%), Exhibitions (8%), GIS (2%), Total Station, DGPS and Topography (2%), and Digitizing Hardware (1%).

Major deviations from average in the three countries are the following:

In the Greek sample lower frequency is observed in applications related to Communication (26%), Audience Engagement (24%) and Digital Presentation of Monuments and Artifacts (22%), while in all other applications the frequency is very close to the average.

In the Italian sample Cards are more frequent than Notebooks and there is a high percentage in applications related to Communication (58%) and Audience Engagement (55%), i.e. to applications related to Public Archaeology.

In the Czech sample Cards composed in situ and Notebooks composed after the excavation are more frequent than other ways of digital excavation

recording, while there is a relatively high percentage in Digital Presentation of Monuments and Artifacts (55%), Digitization of Collection and Archives (45%) and Digital Exhibitions.

The above may reflect an emphasis in the use of digital applications in Italy for the Dissemination, Communication and Public Archaeology in general, while in the Czech Republic for the Digitization and Post-Excavation Management of Excavation Digital Records. In Greece excavations follow the average, but with more emphasis on Excavation-related applications, and less emphasis in Dissemination, Public Archaeology and Digitization applications.

3.3.4 PART D: Which Digital Skills/Competences are Considered Essential by Archaeologists for an Excavation Project

Essential digital skills for an excavation project: In the question concerning the digital skills which are considered by archaeologists as essential for an excavation project, the answers are summarized in Table 18.

Most of the top-voted skills or applications are related directly with in-situ excavation methods and techniques. Photogrammetry and 3D Graphics are considered most essential (56%), followed by Digital Drawings (51%), Digitizing of Monuments and Artefacts (49%) and Digital Notebooks (42%). Less voted are skills related to Public Archaeology and outreach, such as Dissemination of excavation results (39%), Digital Exhibitions (36%), Audience Engagement (27%), Communication (25%) and Storytelling (22%), as well as post-Excavation Management, such as Digitization (34%) and Managing of Collection and Archives (31%). Surprisingly low is the percentage of the Development of digital applications (22%).

It should be noted, however, that there are interesting divergences in the preferences of the responders, on the basis of their country, current position, age and educational level. These differences are presented and discussed below, and they refer to major deviations from the average.

In the following table (Table 18), each number represents the percentage (%) of the responses that each digital tool received against the total responses from each country (GR, IT, CZ) and against the total number of responses (Total):

	GR	IT	CZ	Total
Notebooks composed in the field situ & after the excavation	59	29	23	42
Digital Drawings	55	57	38	51
Photogrammetry	57	61	46	56
3D graphics	62	46	57	56
Digitizing Monuments & Artifacts	45	53	50	49
Dissemination of excavation results to the public	46	39	25	39
Digital Exhibitions	34	37	38	36
Digitization of collections and archives	45	29	20	34
Managing digital archives and/or collections	41	26	18	31
Audience engagement	28	27	27	27
Communication	20	37	21	25
Storytelling	25	27	9	22
Development of digital applications	16	29	27	22
Creating and managing data bases	1	0	0	0
Hardware for digitizing	0	0	0	0
Use of GIS applications	0	3	2	1
Virtual restoration	0	1	0	0

Table 18. Digital skills considered as essential by archaeologists for an archaeological project (in %)

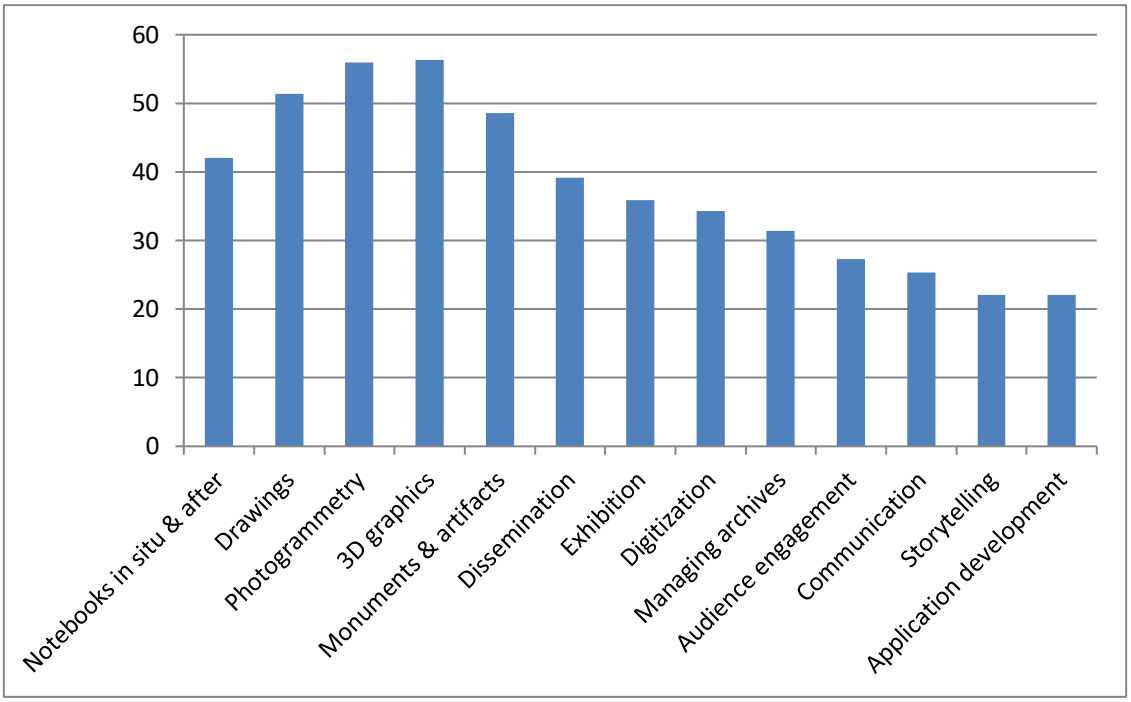

Figure 6. Chart showing the Digital skills considered as essential by archaeologists for an archaeological project (values are based on Table 18)

Differences on the basis of country

In the Greek sample there is a higher preference for Digital Notebooks (59%), the Digitization (45%) and the Management of Collections and Archives (41%). In the Italian sample there is a lower concern about Digital Notebooks (59%) and Digitization (29%), 3D Graphics (46%), and higher preference on Communication (37%). In the Czech sample there is a lower concern about Digital Notebooks (59%), Digital Drawings (38%), Photogrammetry (46%), Dissemination (25%), Digitization (20%) and Managing of Collections and Archives (18%) and Storytelling (9%), but the rest are in agreement with the average.

Differences on the basis of current position

Archaeologists in the Public Sector consider the following as less important (in comparison to the average): Notebooks, Dissemination of the excavation results, Digitization and Managing of Collections and Archives, and Audience Engagement.

Archaeologists in the Private Sector consider the following as less important (in comparison to the average): Digitizing of Monuments & Artifacts, 3D Graphics and Managing of Collections and Archives. On the other hand Digital Drawings and Dissemination of excavation results are considered as more important (in comparison to the average).

Members of University teaching staff consider as less important (in comparison to the average) the 3D Graphics, the Digitization of Monuments & Artifacts.

BA, MA and PhD students consider all digital skills as very important, as shown by the fact that in all categories the percentages are higher than the average. It seems clear that they value them extremely high and they want to acquire a broad array of digital skills in all kinds of applications. PhD students, in particular, they seem to be more interested on Photogrammetry, 3D Graphics and Development of Digital Applications.

A special category are the Specialization students of the Italian sample, which are more selective in comparison to other categories of students. First, they are not so much interested about Excavation Notebooks, most probably because excavation recording in Italy is carried out with the use of Cards. Also they show low preference on digital skills related to post-Excavation Management and Public Archaeology (Dissemination, Exhibition, Storytelling, Audience Engagement, Digitization and Managing of Collections & Archives). On the other hand they show high preference for Photogrammetry, and other Field-related digital applications.

Researchers are much closer to the average in all categories, but overall they seem to show higher preference for Post-Excavation Management (Managing Collections & Archives) and lower preference to Field-related digital applications. This is expected, since research work is mostly characterized by the post-excavation processing of data in the library/office, rather than by the recording and collection of these data in the field.

Overall, it seems that under- and post-graduate students are eager to acquire digital skills in all (or most) applications. Professional archaeologists in the Public and Private Sector seem to be less interested for digital skills related to post-excavation applications. University teachers are close to the average in all categories. The same applies to Researchers, but they seem to be interested more on applications related to post-excavation management and less to field techniques.

The following table shows the digital skills considered as essential by archaeologists for an archaeological project on the basis of their current position. Each number in the following table represents the percentage (%) of the responses that each digital tool received against the total responses of each category. The first column has the overall average for comparative purposes.

	Avrg	Pubic	Priva-te	Profes sors	BA	MA	Spec ial.	PhD	Rese arch	Gradu ates
Notebooks in situ & after	42	21	38	45	57	56	17	41	33	50
Drawings	51	48	67	41	57	64	42	49	37	50
Photogrammetry	56	62	52	48	55	62	83	65	40	17
3D graphics	56	48	43	41	71	62	50	70	43	67
Digitizing Monuments & artifacts	49	41	33	31	62	69	42	43	40	83
Dissemination	39	21	48	34	50	56	8	32	40	33
Exhibition	36	38	29	28	36	51	17	35	33	50
Digitization	34	17	38	28	48	49	8	27	30	67
Managing archives	31	21	19	38	26	46	17	27	43	17
Audience engagement	27	14	33	21	36	26	17	38	23	33
Communication	25	24	33	21	24	33	17	24	20	33
Storytelling	22	17	14	24	36	23	8	19	20	17
Application development	22	14	5	24	10	36	33	38	17	17
Data base	0	0	0	0	0	0	0	0	0	17
Hardware for digitizing	0	0	0	0	0	0	0	0	0	0
GIS	1	7	0	0	0	0	0	0	3	0
Virtual restoration	0	0	0	0	0	0	0	0	3	0

Table 19. Digital skills considered as essential by archaeologists for an archaeological project on the basis of their current position (in %)

Differences on the basis of age

No major deviations can be seen in the responses of the various Age categories. Overall, it seems clear that the highest Age category (50+) has a more selective interest for particular digital applications. In contrast, the lower Age categories are interested to acquire digital skills in all (or most) applications.

The following table shows the digital skills considered as essential by archaeologists for an archaeological project on the basis of their age. Each

number in the following table represents the percentage (%) of the responses that each digital tool received against the total responses of each category. The first column has the overall average for comparative purposes.

	Average	18-30	30-40	40-50	50+
Notebooks in situ & after	42	47	41	30	42
Drawings	51	59	48	43	38
Photogrammetry	56	63	52	52	33
3D graphics	56	66	61	34	38
Digitizing Monuments & artifacts	49	62	44	20	42
Dissemination	39	47	35	25	33
Exhibition	36	42	35	30	17
Digitization	34	42	26	30	21
Managing archives	31	31	33	34	25
Audience engagement	27	34	26	20	8
Communication	25	28	30	23	8
Storytelling	22	24	20	18	25
Application development	22	24	31	11	8
Data base	0	1	0	0	0
Hardware for digitizing	0	0	0	0	0
GIS	1	1	0	2	4
Virtual restoration	0	0	0	2	0

Table 20. Digital skills considered as essential by archaeologists for an archaeological project on the basis of their age (in %)

Differences on the basis of education

The patterns seen in the responses of the various Educational Level categories are similar to the Age categories. Responders, who belong to the lower Educational categories, i.e. students and BA holders, are interested to acquire as many digital skills as possible, in all kind of applications. The same applies to a smaller extent to MA holders, although these responders are more selective, since they are not so much interested on skills related to Communication and Storytelling, but much more on field-related digital skills (Digital Drawings, Photogrammetry, 3D Graphics, Digitization of Monuments & Artifacts). The following table shows the digital skills considered as essential by archaeologists for an archaeological project on

the basis of their educational level. Each number in the following table represents the percentage (%) of the responses that each digital tool received against the total responses of each category. The first column has the overall average for comparative purposes.

	Average	Students	BA	MA	Special.	PhD
Notebooks in situ & after	42	56	50	35	27	38
Drawings	51	56	65	50	55	39
Photogrammetry	56	53	58	73	45	42
3D graphics	56	70	63	73	23	38
Digitizing Monuments & artifacts	49	63	63	55	41	26
Dissemination	39	49	52	32	36	32
Exhibition	36	35	50	36	32	27
Digitization	34	47	50	27	27	24
Managing archives	31	26	44	27	23	33
Audience engagement	27	37	27	30	27	18
Communication	25	26	33	18	41	21
Storytelling	22	35	23	12	27	21
Application development	22	9	31	26	18	21
Data base	0	0	0	2	0	0
Hardware for digitizing	0	0	0	0	0	0
GIS	1	0	0	0	5	3
Virtual restoration	0	0	0	0	0	2

Table 21. Digital skills considered as essential by archaeologists for an archaeological project on the basis of their education (in %)

General Comments

The above evidence suggests that the youngest part of our responders, namely Students, BA and MA holders, who belong mostly to 18-30 and 30-40 Age groups, are eager and interested to learn as many as possible digital skills, covering almost every aspect of excavation and post-excavation work. As expected, they are more enthusiastic about Field-related digital applications, and less about applications related to Post-excavation management and Public Archaeology, probably because they do not have yet much experience or knowledge about these parts of archaeological

work. In any case, their answers showed percentages higher than the average in all categories of digital skills.

On the other hand, responders from the higher Age and Educational Level categories (including Specialization and PhD students), as well as professional archaeologists (from the Public and the Private Sector, from Universities or Research Centers), are much more selective, showing higher preference to digital applications related to their work. More specifically, For example archaeologists in the Public and Private Sector seem to be less interested for digital skills related to post-excavation tasks, while they are more interested on field-related applications, most probably because they are working in rescue excavations for the Public or the Private sector. On the contrary, Researchers are generally more interested on applications related to post-excavation Management and less to field techniques. University teaching staff are close to the average in all categories, but it is interesting to note that they are less enthusiastic and more selective in comparison to their students, although they do not seem to favor any particular applications.

Digital educational tools considered important for a training course on excavation methods and techniques: In the question concerning the importance of the various educational tools for a training course on digital excavation method and techniques there is a clear emphasis on tools/methods which are related to hands-on experience and in-situ practicals: (1) Training In Situ was voted as Extremely Important by 80% of the responders, (2) Hands-on Sessions by 66% and (3) Sharing Expertise with peers by 57%. The next group of tools/methods is related to online resources, i.e. Online Publications, Digital Handbook and Online Resources, which were voted as Extremely Important by nearly half of the responders (54%, 41% and 40% respectively). On the other hand, it is surprising that distant-learning tools, such as Webinars and Online Courses, were voted as Extremely Important only by one fourth of the responders (24% and 22% respectively). This is probably because of their difficulty to imagine the connection between the physical space of the excavation and the digital space (virtual excavation) and the possibility to learn excavation and field methods and techniques through online learning.

In the following table, each number represents the percentage (%) of the responses that each digital tool received against the total number of responses (245).

	Extremely Important	Very Important	Moderately Important	Slightly Important	Not Important
Training in situ	80	16	3	1	0
Hands-on sessions	66	28	6	1	0
Sharing expertise with peers	57	30	10	3	0
Publications available online	54	38	12	1	1
Accreditation	46	26	12	11	5
Digital handbook and syllabus	41	33	20	5	1
Online resources	40	36	19	5	1
Methods of assessment	27	33	20	16	4
Webinars	24	28	31	12	5
Online courses	22	29	30	17	3

Table 22. Digital educational tools considered as essential by archaeologists for a training course on excavation methods and techniques (in %)

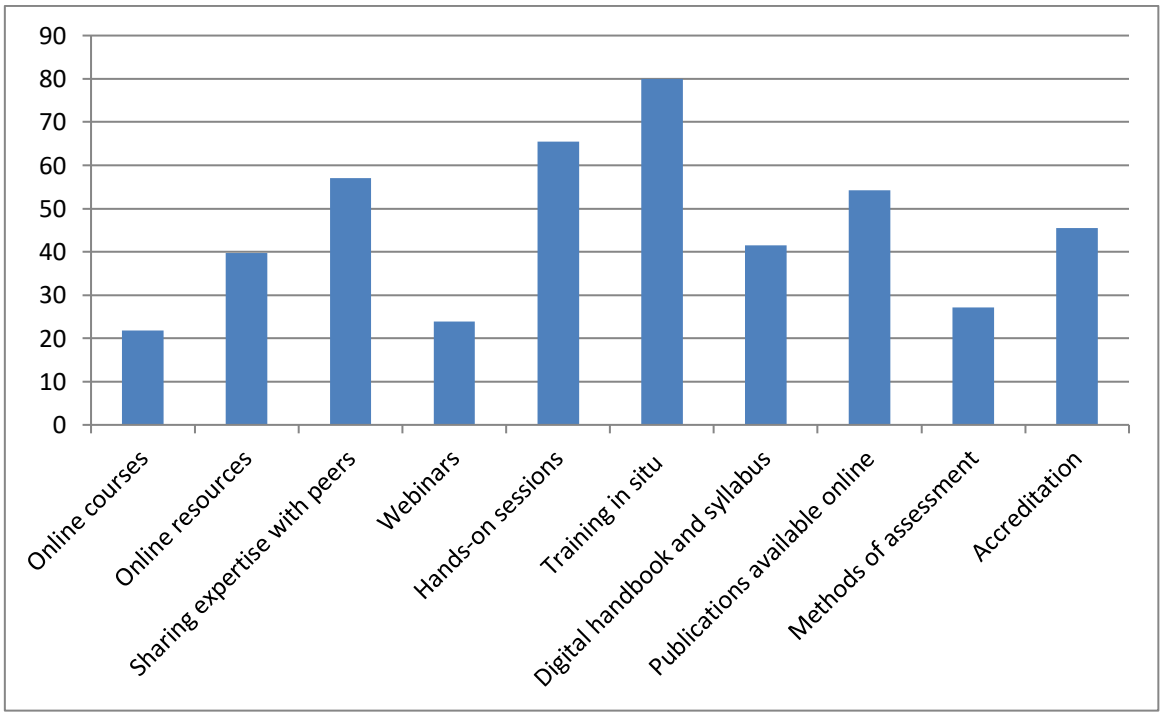

Figure 7. Chart showing the digital educational tools considered as essential by archaeologists for a course on excavation methods and techniques (values are based on Table 22)

Massive Open Online Courses (MOOC): only 17 out of 245 respondents (7%) have taken part in MOOCs, and have some experience in this digital method of learning. The percentage is very small and not suitable for any analysis. The main point arising from this question is the lack of MOOCs concerning digital application in excavation techniques, in the three countries and beyond.

4 Final Discussion

The analysis of the data deriving from the Desk and Field Research contributes valuable information for the design of an effective digital course on the application of digital tools in archaeology, which is the main objective of Intellectual Output 1 and of the DELTA project, in general. A summary of the results of the analysis made above is needed before assessing their importance for the design and development of the DELTA course.

The evidence from the Desk Research Questionnaire, in particular, provided a thorough picture of the archaeological curricula in the three participating countries, concerning:

(a) higher education courses on Excavation Methods and Techniques
(b) the use of digital applications in Archaeological Excavations
(c) the use of digital educational tools in courses about Excavation Methods and Techniques

In all three countries the archaeological curricula include a large number of courses on Archaeology, Excavation and Field Methods and Techniques. However, it became clear that BA studies in the Czech Republic are much more focused on archaeology, since they consist almost exclusively of courses on archaeology, while in Greece and Italy the curricula include also other courses on related subjects, such as History, Ancient Literature and Classics.

On the other hand, the archaeological curricula in all three countries include compulsory practical training in Excavation and Field Methods and Techniques, with a varying duration, usually between 10 and 21 days. Furthermore, of special importance for the DELTA project is the fact that in all educational excavations the use of digital tools is the norm, and students are trained in the application of these digital tools in the field. In Greece, however, the application of digital tools in excavations and the training of students is a rather recent phenomenon.

Useful conclusions were also made on the basis of the analysis of the Online Questionnaires. Because these Questionnaires were filled in by students, scholars, colleagues and professionals, they provide valuable insights regarding the existing skills and the aspirations of the people engaged in the discipline of Archaeology. Furthermore, because all categories of age, gender, position, affiliation and educational level are well represented in the sample, the answers reflect the opinions, ideas, expectations and aspirations of almost all people related to archaeology. Four points are the most important regarding the aims and objectives of the DELTA project.

The first point concerns the training of students in the use of digital tools in archaeology. There are sharp differences between the three countries, with Greece having the lowest percentage (17%), the Czech Republic the highest (59%) and Italy lying in between (39%). These differences are partly because of the belated introduction of digital tools in Greek excavations. Nevertheless, even in the more digitally advanced countries, there is still a large percentage of archaeologists who feel digitally "illiterate", regarding the use of digital tools in archaeological projects. This observation reinforces the *raison d'etre* of the DELTA project and its major premise that a special course on digital applications in archaeological projects should be included in the relevant academic curricula.

The second point is the acknowledgment of the limited range of digital tools used in archaeological projects, and in which students of archaeology are trained. The analysis of the responses to the Online Questionnaire showed that students' training is confined to digital tools related to excavation recording, such as the use of Digital Notebooks/Cards, Digital Photos and Photogrammetry; in contrast, other tools related to post-excavation tasks, such as Public Engagement, Dissemination and Communication of archaeological knowledge, and Digital Presentation and Management of objects, archives and collections are rarely included in the syllabus of these courses.

The third point is related to the fact that digital educational tools have rarely been applied in courses of Excavation Methods and Techniques. In Greece they are virtually absent (1%), while even in the more digitally advanced curricula of the Czech Republic the percentage is disappointingly low (26%), with Italy lying in between (18%).

Finally, the fourth point, which may not be of a surprise, is that students and junior scholars (i.e. responders of 20-30 and 30-40 years of age, and students in BA, MA, Specialization and PhD Programs) are eager and interested to learn as many digital skills as possible, covering almost every aspect of excavation and post-excavation work. This comes in contrast to the preferences and aspirations of more senior scholars and professionals, who are more selective, being interested mostly on digital tools related to their own work and research.

The above points corroborate and justify the main objectives of the DELTA project regarding the design and development of a special course which will train students and professionals of archaeology to the use of digital tools in archaeological projects. The design of this course should be made in a way,

which will allow easy and seamless incorporation in the existing archaeological curricula.

The new course should include training in as many digital tools as possible. This means that it has to include not only the tools that are usually applied in excavation tasks, such as Digital Notebooks, Drawings and Photogrammetry, but also tools for post-excavation tasks, such as Managing of Archives and Collections, Digital Presentation and 3D Reconstruction of Monuments and Artifacts, as well as the Dissemination and Communication of excavation results, Storytelling, and Engagement of the Public in the archaeological work.

Finally, one of the most important deficiencies of the existing archaeological curricula is the limited (if any) application of digital educational tools in archaeological training. The application of such tools in the blended course, which is planned by the DELTA project not only will provide students of archaeology with new digital skills, but it will also enable a more effective integration of classroom lessons with field training.

5 Appendices

5.1 Appendix I: The Desk Research Questionnaire

The following fields were included in the Desk Research Questionnaire, structured into three major groups

GROUP A. General Institution Data

1. Provider (University or other)
2. Department
3. Country of provider
4. City of provider
5. Level (BA:6, MA:7, PhD:8)
6. Title of Program
7. Brief description of program
8. Duration (in semesters)
9. Website
10. Contact Person
11. Contact Person (Position or Affiliation)
12. Contact Person (email)
13. Type of training (class, MOOC, e-learning, distant, webinar)
14. Subjects taught (e.g. archaeology, history, art history, excavation, museology)
15. Language taught (EN, national, other)
16. Teaching methodology (lectures, meetings with professionals, tutoring)
17. Methods of Assessment (tests, in situ practice, thesis, presentation, oral/written exams)
18. Prerequisites for participation to the program (if any)
19. Accreditation (certification of attendance, BA, MSc, MA, PhD, other)
20. Number of Courses (minimum no. for acceditation)
21. ECTS (minimum no. for accreditation)

22. Number of Archaeology courses (total no. offered by the program)

23. Number of Archaeology courses (minimum no. needed for accreditation)

24. ECTS of Archaeology courses (minimum no. needed for accreditation)

25. Field Techniques courses (total no. offered by the program)

26. Field Techniques courses (minimum no. needed for accreditation)

27. ECTS of Field Techniques courses (minimum no. needed for accreditation)

28. Internship in other Institutions (Y/N)

29. Type of Institutions for Internship

30. ECTS provided from Internship

31. Employment Opportunities

32. Other useful information

GROUP B. Courses on Field Techniques

1. Provider (University or other)

2. Department

3. Title of Program

4. Title of Field Technique Course

5. Brief description (if available)

6. ECTS of Field Technique Course

7. Does the course include practice in excavation? (Y/N)

8. Type of Excavation Practice (Compulsory/Optional)

9. Brief description of Excavation (site, dating, type, if available)

10. Duration of Excavation Practice (minimum, in days)

GROUP C. Digital tools and skills

1. Use of digital tools in Excavation Practice? (Y/N)

2. Which digital tools are used in Excavation Practice?

3. Which digital skills are provided by Excavation Practice?

4. Transferable/soft skills provided by Excavation Practice?

5. Modules of DELTA included in Excavation Practice

(a) Digital Tools in Excavation

(b) Digital Documentation

(c) Digital Preservation and representation

(d) Excavation as Public Archaeology

5.2 Appendix II: The Online Questionnaire

The following questions were included in the Online Questionnaire, divided into four major parts.

PART A. General personal data

Name and Surname

Email address

Current Specialization [drop down menu including: Archaeologist, Museologist, Historian, Teacher, Other (please specify)]

Current Position [drop down menu including: Public Service, Private Sector, University Professor, Researcher, PhD student, MA student, BA student, Other (please specify)]

Organization or University

Country of residence [drop down menu]

GDPR requirements for survey registrations

We assure you that the information you provide will not be distributed to other persons and will be used only for research purposes related to DELTA project. The information collected will be confidential. We will only use your data to send you digital communications related to DELTA project. We do not share your information with third parties. Information provided by you will be used in a generalized form for reporting purposes. We will retain your data for as long as necessary or until you give us instructions to delete it (by sending request to the email:deltaproject.eu@gmail.com). You can find more information about the project at the website: http://www.project-delta.eu/

Thank you in advance for taking the time to complete this survey! Estimated time for response is approximately 10 minutes.

I consent to receiving digital communications (emails, newsletters) from the DELTA project about further events and project related activities. I understand I can opt out of receiving further communications at any time by using the email provided in DELTA digital communications.

Yes

No

I consent to having my information (provided by you above) used in a generalized form for reporting purposes.

Yes

No

Gender (drop down menu)

Age (drop down menu)

Education level [drop down menu including: BA, MA or MSc, PhD]

PART B. Training in digital excavation methods and techniques during your studies

1. During your years as a student did you participate in any course which included training in excavation methods and practices?

Yes

No

If yes, which training course(s) have you completed? [Please provide name of the course and from which University] [up to 100 words]

2. Did the course(s) in excavation methods and practices include training in digital applications?

Yes

No

If yes, what type of digital applications? [You can select more than one box]

Digital notebooks composed in situ

Recording cards filled in situ

Digital notebooks composed after excavation

Recording cards filled after excavation

Digital photos

Digital drawings

Photogrammetry

3D graphics

Digital presentation of cultural heritage monuments and artifacts

Dissemination of excavation results to the public

Digital exhibition

Digitization of collections and archives

Managing digital archives and/or collections

Audience engagement

Communication

Storytelling

Application development

Other (please specify)

3. Were the course(s) in excavation methods and practices taught with the use of digital educational tools?

Yes

No

If yes, through which digital educational tools? [You can select more than one box]

Massive Open Online Courses (MOOC)

E-learning

Webinar

Other (please specify)

PART C. Professional experience in digital excavation methods and techniques

1. Have you taken part in any excavation as professional archaeologist or researcher?

Yes

No

If yes, which excavation? [Please provide name of an excavation project (name up to 3 excavations) and in what capacity, e.g. director, trench supervisor, specialist, researcher] [up to 100 words]

2. Did the aforementioned excavation project(s) use digital applications as part of their methodology?

Yes

No

If yes, what type of digital applications? [You can select more than one box]

Digital notebooks composed in situ

Recording cards filled in situ

Digital notebooks composed after excavation

Recording cards filled after excavation

Digital photos

Digital drawings

Photogrammetry

3D graphics

Digital presentation of cultural heritage monuments and artifacts

Dissemination of excavation results to the public

Digital exhibition

Digitization of collections and archives

Managing digital archives and/or collections

Audience engagement

Communication

Storytelling

Application development

Other (please specify)

PART D. Digital skills/competences needed by archaeologists for an excavation project

1. In which of the following digital methods would you like to acquire skills? [You can select more than one box]

Digital notebooks in situ and after excavation

Digital drawings

Photogrammetry

3D graphics

Digital presentation of cultural heritage monuments and artifacts

Dissemination of excavation results to the public

Digital exhibition

Digitization of collections and archives

Managing digital archives and/or collections

Audience engagement

Communication

Storytelling

Application development

Other (please specify)

2. To your opinion, how important are the following for a training course on digital excavation methods and techniques? [Multiple options – the user needs to evaluate for each response from scale of: Extremely Important – Very Important – Moderately Important – Slightly Important – Not Important]

a. Online courses

b. Online resources

c. Sharing expertise with peers

d. Webinars

e. Hands-on sessions

f. Training in situ

g. Digital handbook and syllabus

h. Publications/papers/reports available online

i. Methods of assessment

j. Accreditation

3. Have you ever taken part in a Massive Open Online Course (MOOC)?

Yes

No

If yes, which course(s) have you completed? [Please provide title of course, organization/university, duration of the course] [up to 100 words]

Submitted! Your contribution is really appreciated!

5.3 Appendix III: Online Questionnaire: Responses

PART B
Question: During your years as a student did you participate in any course which included training in excavation methods and practices?
Title of Table: Number of answers per course

Greek questionnaire

Course Title	University	No
Topography-Architecture-Excavation Techniques	NKUoAthens	**35**
Excavation Techniques, Processing of Archaeological Finds and Museum Studies	NKUoAthens	**25**
Introduction to Archaeology	NKUoAthens	**10**
Excavation - Archaeological Drawing	AUoThessaloniki	**2**
Course in excavation methodology	AUoThessaloniki	**2**
Excavation Techniques	UoThessaly	**1**
Archaeological excavation - Field research	UoCrete	**1**
Méthodes de travail en Archéologie	UParis1	**1**
Metodologia della ricerca archeologica	UoBologna	**1**
Archaeological Methodology and Theory	UoEvansville, USA	**1**

Italian questionnaire

Course Title	University	No
Metodologia della ricerca archeologica	UNIBasilicata	**11**
Metodologia della ricerca archeologica	Sapienza	**5**
Metodologia della ricerca archeologica	UoMessina	**4**
Metodologie e Tecniche della Ricerca Archeologica	UoNapoliOrientale	**3**
Archeologia del paesaggio	UNIBasilicata	**2**
Metodologie e tecniche dello scavo archeologico	UNIBasilicata	**2**
Metodologia dello scavo archeologico	UoPerugia	**2**
Corso sulla sicurezza sul cantiere	UNIBasilicata	**1**
Archeologia greca, *Archeologia della province romane*	UNIBasilicata	**1**
Archeologia Classica	UNIBasilicata	**1**
Metodologia della Ricerca archeologica	UoCalabria	**1**
Metodologia della ricerca archeologica	UoMilano: **1**	
Metodologia della ricerca archeologica	UoPalermo	**1**
Corso sul campo di metodologie di Scavo	UoPalermo	**1**
Metodologie della ricerca archeologica	UoNapoliFederico II	**1**
Tecniche di Rilievo digitale applicate all'Archeologia	UoNapoliBenincasa	**1**
Metodologia e tecnica degli scavi	UoPadova	**1**
Metodologie e Tecniche dello Scavo Archeologico	UoBologna	**1**
Metodologia della ricerca archeologica	UNICalabria	**1**
Archeologia della magna grecia	UNICalabria	**1**
Formazione in Recupero in scavo delle Evidenze Bioarcheologiche	UoNapoliBenincasa & UoNapoliVanvitelli	**1**
Tecniche dello scavo archeologico	UoPisa	**1**
Tirocinio di scavo archeologico	UoBologna & UoMacerata	**1**
Historia en la Tierra, Arqueología de la Antigüedad, Arqueología medieval y postmedieval	UoAlicante	**1**
Disegno Archeologico, Corso di formazione sull' uso del Laser Scanner	UoMessina	**1**
Corso di Metodologia della ricerca archeological	UoSalerno	**1**

Insegnamento di metodologia della ricerca archelogica; laboratorio di informatica applicata all'archeologia	UoBari	**1**
Scuola di Specializzazione in Beni Archeologici (SSBA) Matera come ultimo con laboratori vari e corso sulla prevenzione	UNIBasilicata	**1**
3 Campagne di scavi a Taormina con Restauro di affreschi, 2 Campagne di scavo a Troina		**1**
Attività di scavo presso il sito di Herakleia/Policoro oltre alle attività di ricognizione nei territori della Chora della medesima polis	UNIBasilicata	**1**
Archeologia Classica		**1**
Scavo archeologico, laboratori di ceramica e numismatica, ricognizione		**1**
Laboratorio di disegno archeologico		**1**

Czech questionnaire

Course Title	University	No
Practice of archaeological excavation	MasarykUNI	**13**
Methodology of archaeological prospection and excavation	MasarykUNI	**7**
Practice of archaeological excavation	UoWBohemia	**5**
Field Archaeology theory and practice	UoPrague	**4**
Field documentation	MasarykUNI	**3**
Documentation Techniques	MasarykUNI	**2**
Field Archaeology theory	MasarykUNI	**2**
Field theory and practice	MasarykUNI	**2**
GIS in Archaeology	MasarykUNI	**2**
Field methods of Archaeology	UoPilsen	**2**
Practice of archaeological excavation	UoPrague	**2**
Summer practice	UoHradec Králové	**2**
Field research methods	MasarykUNI	**1**
Introduction to Archaeology etc	MasarykUNI	**1**
Geodesy in archaeology	MasarykUNI	**1**
The Basics of Theoretical and Practical Preparation and Realization of Archaeological Excavation	MasarykUNI	**1**
Archaeological prospection practice	MasarykUNI	**1**

Methodology of the treatment of early medieval pottery	MasarykUNI	**1**
Advanced methods of archaeological documentation and analyses of spatial data	MasarykUNI	**1**
Photodocumentation	MasarykUNI	**1**
Computer Technology	MasarykUNI	**1**
Prehistory	UoPrague	**1**
Management of archaeological research	UoHradec Králové	**1**
Practice of archaeological excavation	UoHradec Králové	**1**
Introduction to Archaeology	UoHradec Králové	**1**
Practice of archaeological excavation in České Budějovice	UoSBohemia	**1**
Practice of archaeological excavation in Opava	SilesianUoOpava	**1**
Methods of field research	UoBratislava	**1**
Analyzing and Presenting Archaeological Data	UoWinchester	**1**
Personal Research Methodology	UoWinchester	**1**
adasda?	MasarykUNI	**1**
Field Archaeology theory, Practice of archaeological excavation		**1**

PART C

Question: Have you taken part in any excavation as professional archaeologist or researcher?

Title of table: List of excavation projects

Greek questionnaire

1. Halasarna, Kos
2. Pella
3. Koumasa
4. Tiryns
5. Kionia, Tinos
6. Xobourgo, Tinos
7. Skotoussa, Karditsa
8. Kastelli, Chania,
9. Armenoi, Rethymnon
10. Apodoulou, Rethymnon
11. Hephaistia, Lemnos
12. Sibari, Italy
13. Kirra
14. Mnemouria-Krasades
15. Paleopolis, Andros
16. Zakros, Crete (volunteer)
17. Plasi, Marathon, Attica,
18. Brexiza, Marathon
19. Anavlochos, Crete
20. Akrotiri, Thera
21. Mitrou
22. Halai
23. Pelekita Cave, Crete
24. Stelida Naxos
25. Gaidourofas, Crete
26. Pylos
27. Achlada, Florina
28. Petras, Crete
29. Zominthos, Crete
30. Routsi, Messenia
31. Vathy, Astypalaia
32. Pantotinou Koryfi, Crete
33. Stavromenos, Crete
34. Mt Lykaion
35. Lamia
36. Halos
37. Pachi, Megara
38. Kalapodi, Phthiotis
39. Gourimadi, Euboea
40. Koukonisi, Lemnos
41. Avgi, Kastoria
42. Ornos, Mykonos
43. Iria, Naxos
44. Eleusis, Attica
45. Dikili Tash, Macedonia
46. Chrysokamino, Crete
47. Mycenae
48. Lefkandi, Euboea
49. Eleutherna, Crete
50. Aiani, Kozani
51. Samothrace
52. Epidaurus
53. Thorikos, Attica
54. Tzannata, Cephalonia
55. Iklena Messenia
56. Agios Vasilios, Laconia
57. Itanos
58. Kolonna, Aegina
59. Samos
60. Corinth
61. Kommos
62. Makrigialos, Macedonia
63. Azorias, Crete
64. Mochlos, Crete
65. Chrissi, Crete
66. Gyroulas, Naxos
67. Kantou, Cyprus
68. Avdimou, Cyprus
69. Orei

70. Dhaskalio, Keros
71. Sissi, Crete
72. Bulla Regia, Tunisia
73. Volubilis, Morocco
74. Fezzan, Libya
75. Tell Nader, Iraq
76. Kakovatos, Elis
77. Archanes, Crete

Italian questionnaire

1. Cuma
2. Pantelleria
3. Scavo Archeologico Canonica di San Niccolò a Montieri
4. Scavo Archeologico Regio V - Parco Archeologico di Pompei
5. Taormina
6. Troina
7. Apolline Project
8. Norba
9. Ascoli Sarriano
10. Satrianocdi Lucania
11. Ossaia, Cortona
12. Santa Maria d'Angola
13. Castrum di Metaponto
14. Benevento
15. Palatino
16. Spolitino
17. Macchiagrande
18. Villa S. Pio X
19. Cupra Marittima
20. Rocca MOntis Dragonis
21. S. Vincenzo al Volturano
22. Difesa San Biagio
23. S. M. d'Anglona
24. Metaponto
25. Pontecagnano
26. Farch (Ferrandina archeologica)
27. Ritorno ad Anxia
28. Grumentum
29. Kastrì-Pandosia
30. Satrianum
31. Leptis Magna, Libia
32. Festòs, Creta
33. Catania, Ipogeo quadrato
34. S. Caterina, Rocca Imperiale
35. Soriano Calabro
36. Palazzo delli Ponti
37. Taranto
38. Palmi
39. Cerveteri
40. Pompei
41. Qatna, Siria
42. Progetto Chora, Torre di Satriano
43. Progetto Egnazia
44. Tempio Maggiore, Acropoli di Cuma
45. Parco Archeologico di Locri Epizefiri
46. San Bartolomeo, Roma
47. Catacomba SS. Casto e Secondino (Sessa Aurunca
48. Basilica di Capo Don (Riva Ligure
49. Santa Maria d'Anglona, Tursi
50. Sant'Imbenia (SS)
51. Cattedrale di Bitonto
52. Casoni della Fortezza Angioina di Lucera
53. San Michele. Bari
54. Gortyna di Creta
55. Herakleia (Policoro)
56. Acropoli di Gela
57. Teggiano
58. Policoro (Siris-Herakleia)

59. Parco Archeologico della Valle dei Templi, S. Biagio
60. Villa Romana e Necropoli Coda di Volpe, Messina
61. Terme Tifernum Metaurense
62. Monte Sannace

Czech questionnaire

1. Slaný-Velvary
2. Bílina Mine
3. Bazilika sv. Václava, Stará Boleslav
4. Cornštejn
5. Rovný
6. Bobrová
7. Domašín
8. Zálezlice Protipovodňová hráz
9. Vinoř V Žabokřiku
10. Slaný Lounská brána
11. Priniatikos Pyrgos, Crete
12. Nivica, Albania
13. Kadaň Monastery, tomb of Magdalena z Kolovrat
14. Ceramic center Montelabate
15. Porta Nola, Pompei
16. Segni
17. Vráble
18. Těšetice
19. Pasohlávky
20. Mohelno
21. Jívová - castle Tepenec
22. Dolní Újezd
23. Čechovice
24. Libkovice
25. Kalich
26. Přísečnice
27. Roztoky
28. Tišice
29. Březnice
30. Pohansko u Břeclavi
31. Otres
32. Zadní Hrúd
33. Tismice
34. Kavkaz
35. Chumara, Dartmoore
36. Hound Tor, Drazice
37. Müllerův dům
38. Otice \rybníčky
39. Nové Heřminovy (Archaeologist)
40. Brno - Vlněna 2, 3 and 4
41. Chrudim
42. Slatiňany
43. Slaný-Velvary
44. Velvary
45. Troubsko, Rozdrojovice, Tišnov
46. Nebesa u Aše
47. Hradec nad Svitavou – Lačnov
48. Popůvky
49. Ostrovačice
50. Ivančice-Budkovice
51. Monastery in Teplá
52. Libkovice
53. Těšetice-Kyjovice
54. Bořitov Zlámanina
55. Lažany
56. Kaymakçı, Turecko
57. Al-Rifai - Tell Jokha, Irak
58. Svodín, Slovak Republic
59. Starovice u Hustopeč
60. Předmostí u Přerova
61. Prague Castle and Hradčany
62. Rybník, Slovakia
63. Vráble, Slovakia
64. Pohansko u Břeclavi
65. OtresBřeclav - Na včelách

PART D

Question: Have you ever taken part in a Massive Open Online Course (MOOC)?

Title of table: List of Massive Open Online Courses (MOOC)

List of MOOCs

Greek questionnaire

1. Courses on the online platform coursera.org on GIS applications
2. Courses on the online platform of Stanford University, on GIS applications
3. Discovering Greek and Roman Cities, Erasmus+ Strategic Partnership "Ancient Cities. Creating a Digital Learning Environment on Cultural Heritage", under the auspices of DAAD, a co-operation between: AARHUS University, NKUA, Universitetet Bergen, Kiel University, Open Universiteit, and Pantheon Sorbonne. Duration of the course: 8 weeks. Language: English.
4. GIS for Archaeologists, e-learning NKUA
5. NEMO (Network of European Museum Organisations) Webinar "From Museum Education to Public Engagement-Trends and practices in European museums"
6. How to improve Gender Equality & Workplace Inclusivity - Udemy (3 h)
7. Inclusion, Equality and Diversity - Udemy (3 h)
8. Inclusive Leadership: Working with Equality and Diversity - Udemy (10 h)
9. Lead through Diversity and Inclusion - Udemy (3 h)
10. Mentor for Impact - Udemy (3 h)
11. The Art of Science Communication - American Society for Biochemistry and Molecular Biology (20 h)
12. Discovering Science: Science Writing – University of Leeds (10 h)
13. Data Scientist with R Track – DataCamp (100 h)
14. The Online Educator, MOOC by the Open University, Future Learn Platform

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15. People studying People, MOOC by The Open University/The University of Leicester, Future Learn platform
16. The Power of Podcasting for Storytelling, MOOC by Deakin University, Future Learn platform.
17. Archaeology's Dirty Little Secrets, Brown University
18. Goethe Institut Cultural Heritage Management

Italian questionnaire

1. Essenziale Digital Skills for Museum Professional, Mu.Sa, 6 mesi
2. Digital Cultural Heritage (EduOpen/Università Politecnica delle Marche/57 ore). Scrum Fundamentals Certified (www.scrumstudy.com)
3. Clil università Ça Foscari Venezia

Czech questionnaire

1. Digital Earth: The Use of Location Technologies for All, Elmhurst College, 4 weeks
2. Coursera, udemy, Machine learning by Andrew Ng
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