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HERITAGE EDUCATION AND INITIAL TEACHER TRAINING: AN INTERNATIONAL EXPERIENCE

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The great interest and debate on teachers 21st century skills development is closely connected with a "new" approach to education and learning which inevitably affects the present and the future of the whole education system. Roma Tre University Museum Education Centre took part in the Erasmus+ DICHE project (Digital Innovation in Cultural Heritage Education) and carried out activities taking into consideration the project theoretical model: informing primary school teachers of new education practices in cultural heritage fruition which employ technologies and also include the evaluation of their effectiveness in learning in terms of competences development. A web app devoted to integrate technology in heritage fruition within primary school education was designed and implemented as one of the project core activities. This paper presents the development and the piloting of this application for mobile devices as a tool for teachers in training: the MuseTech web app.

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1 Introduction

The combination of heritage, education technology and teacher initial training was explored and investigated from different point of views within the Erasmus+ DICHE project, *Digital Innovation in Cultural Heritage Education*. The research group, based at Roma Tre University, carried out its research within the main objectives of the project, which were primarily focused on informing primary school teachers, including both in service and in-training teachers, about new education practices which include heritage education, technologies employment and the evaluation of their effectiveness in learning (Poce, 2018).

Roma Tre University Centre for Museum Education was in charge of the design of pilot activities, taking into consideration the DICHE project theoretical model described in the following paragraphs. Some of the core activities were devoted to the creation of a web app aimed at integrating technology in heritage fruition within primary school education. Initial training teachers were involved in the use and evaluation of the app itself in terms of employment within their teaching and learning activity and findings related to assessment practices put in place are herewith presented. The objectives of the activity relate to the development of transversal and professional skills of in-training teachers: in particular, teachers had the opportunity to promote their digital skills and knowledge, through the use of the MUSETECH webapp, focused on heritage fruition and museum education. Professional skills, like design, implementation and evaluation of teaching and learning paths have also been promoted thanks to interaction activities with other teachers; communication skills and critical thinking skills have been developed through the specific webapp technical features.

2 State of the Art

The advent of new technologies carries remarkable implications for education due to the different nature of the cultural mediation it is based on. Parry (2007, 9) makes reference to McLuhan and starts from what he calls "the rudiments" of media theory in order to explain how and to what extent the digital dimension of museums affects the activities and experiences museum audiences are offered. In the postmodern age we live in, Parry's view, which may be agreed with or not, basically concerns the influence that the medium exerts on the message. Indeed, as he states: "Far from being a passive and putative vessel merely carrying content, the medium used has a vital role to play in the construction of any communicated message."

According to Parry, every communication technology entails a series of associations and consequences for the audience. In other words, users assign a

number of personal meanings to the medium, which are later connected to the very message conveyed; thus, it is necessary to carefully select the medium to convey meaning.

Issues concerning the use of new technologies in teaching and learning have called the attention of policymakers and educators at global level in recent years. The Italian National Plan for Digital Education, which served as a central pillar of "La Buona Scuola" school reform (Law 107/2015), promotes the experimentation with new teaching methods, the use of innovative tools, the dissemination of good practices, the development of school curricula, and the increase of laboratory activities. In this document, the use of technology in school is strictly linked with an intensive teacher-learner interaction (called "human relationship", p. 7) and with a profound educational awareness, thanks to which digital competences are related to the challenges that society faces in interpreting and supporting lifelong learning (life-long) (see also European Commission High Level Conference document, 2014; New Vision for Education Report of the World Economic Forum, 2015; "Education for the 21st Century" study of The European House – Ambrosetti, 2014). Therefore, teachers training must support the development of digital competences to better fulfil the role of educators in contemporary society. Furthermore, the more digital literacy relates to the development of other transversal skills (such as critical thinking, communication, social and cross-cultural skills), the more it is functional and linked to the aspect of lifelong learning (P21 Framework definitions, 2015).

Before providing schools with expensive technology equipment, which rapidly becomes obsolete, it is of paramount importance to enable teachers to use technology and digital tools in general, in order to effectively introduce them in courses.

The national guidelines for primary school issued by the Italian Ministry of Education in 2012[1] stress the importance of studying arts and cultural heritage in the early years of schooling, especially in the context of experiential education where children learn about the world through a multisensory approach, based on different techniques:

> Children's encounter with art allows them to look at the world with different eyes. Exploring materials through the senses, experimenting with new techniques in the school laboratory, observing places (squares, gardens, and landscapes) and works of art (paintings, museums, and architectures) help children to improve their perceptive skills and nurture the pleasure of enjoying and creating art, thus bringing art and cultural heritage closer to children. (p. 20)

[1] Online in Italian at: http://www.indicazioninazionali.it/documenti_Indicazioni_nazionali/indicazioni_nazionali_infanzia_primo_ciclo.pdf

In this light, the Roma Tre research group developed a digital menu of possible teaching scenarios, which includes the use of technologies for cultural heritage enjoyment and which later became an application for mobile devices, which was used and evaluated by a considerable number of users, initial in-training teachers, in particular, as discussed in the following paragraphs. The main aims of the teachers' training activity under investigation are the following:

- to design and implement the MUSETECH webapp for teachers' training activities;
- to use culture heritage education and digital tools to promote transversal and professional skills in in-training teachers;
- to development digital tools use and digital skills promotion in teachers' training activities.

3 Research design and methodology

In October 2016, a module for primary school in-training teachers was launched within the "Educational Research Methodology", Department of Education, Roma Tre. In particular, the 180 in-training teachers participating in the course were those in the second year of the five-year-long degree course in Primary Education Sciences. The "Educational Research" module was scheduled in one term and dealt with the DICHE project theoretical and practical aspects. In addition, from October to December 2016, two hours a week, attendees were involved in activities concerning the design of innovative education projects with the purpose of promoting cultural heritage and developing learners' 4C skills.

The DICHE project-related areas devoted to the training module were the following:

- basic contents: Museum Education and cultural heritage promotion;
- the KSAVE (Knowledge, Skills, Attitudes, Values and Ethics, Griffin et al. 2012) model and cross-sectional skills assessment tools;
- the DICHE project Research Agenda;
- the DICHE menu of teaching scenarios for arts and cultural heritage education;
- the Baths of Diocletian National Museum (CoopCulture[2] was responsible for this part);
- Museum Education experiences integrating the use of digital tools to enjoy the visit at the Baths of Diocletian National Museum.

[2] CoopCulture is the acronym for Società Cooperativa Culture, a DICHE project partner. https://www.coopculture.it

3.1 Training of teachers, students and museum educators

Lessons were taught by Roma Tre researchers, with the help of CoopCulture staff who were responsible for the contents concerning the Museum selected as the location of the pilot phase activities. Roma Tre researchers also took care of teaching materials' preparation, including the translation into Italian of texts to be distributed to participants such as DICHE Research Agenda and the KSAVE model document regarding the "4C" skills to be developed within the experience, namely communication, collaboration, critical thinking and creativity (Trilling & Fadel, 2009).

In order to carry out the activity aimed at designing Museum Education experiences based on the DICHE model, in-training teachers were divided into 18 groups of approximately 10 units each and were asked to collaboratively work on an online document stored on Google Drive and shared with group members and with Roma Tre researchers, the latter playing the role of e-tutors throughout the whole process. The selection of an online platform to store and share files was meant to allow learners to autonomously work on the project from home and, simultaneously, to allow e-tutors to monitor and revise projects, and to provide participants with feedback and support.

Student groups were given precise instructions on how to properly carry out the activity. In detail, the project, to be written as the basis for the design of museum education experiences, had to focus on the following elements: Primary school children as target learners, the use of technology and digital tools (to be selected in the DICHE menu) as methodology and museums' arts and cultural heritage as content. Moreover, the goal of these experiences had to be the development of one or more within the so-called "4C" skills list (communication, creativity, collaboration and critical thinking). For this purpose, stimulus questions were proposed by the researchers to student groups to help course design. Some are given below:

1. Which skills are to be developed in the course? How, and through which activities?
2. How and when technology and digital tools will be introduced?
3. Which museum artifacts will be used and how?
4. What is the final structure of the course?

Another important aspect of the Museum Education experiences designed by students was that they had to be in line with the Italian national guidelines for primary school education, an official document issued by the Ministry of Education and dealing with the learning objectives of each year of primary school in terms of knowledge, abilities and skills children are expected to acquire and develop.

Moreover, the document to be written when designing courses had to follow specific guidelines concerning the word limit of each section, which read as follows:

1. Hypothesis and Objectives: between 250 and 300 words
2. Didactic Unit: between 200 and 250 words
3. Expected Results: between 250 and 350 words

In the first section, titled *Hypothesis and Objectives*, students had to present and discuss their project hypothesis and objectives. Accordingly, this section also contained a list of the target skills selected and their definition.

- The *Didactic Unit* represents the structure of the course. Students were asked to design units including the following elements:
- Title of the course
- Description of the course
- Target learners, i.e. type of pupils and class
- Structure of the course, i.e. number of lessons, types of activities and tools, lesson schedule and programme. This sub-section is the largest part of the unit
- Duration of the whole course and of lessons and outings
- Teaching materials, i.e. booklets, videos, audio files, etc., especially with reference to the digital and technology tools selected between those offered in the DICHE menu of teaching scenarios
- Assessment of the course, i.e. type of assessment activities, methodology, test duration

The third section, namely *Expected Results*, presents the results students are expected to obtain at the end of the course.

Students took part in the design activities until December 2016. For this purpose, they were divided into 18 groups of 9 or 10 people each and started working on their project: 17 groups fully completed their task. In other words, at the end of this phase, 17 courses were produced according to the Research Agenda theoretical framework and to the DICHE menu of teaching practices.

4 The DICHE Menu of teaching practices

The menu is the digital tool which comprises all the theoretical contributions offered by DICHE partners and which translates the methodological approaches to basic skills' development into teaching scenarios through cultural heritage enjoyment and technology use. The menu[3] is an online database which contains

[3] Available at http://www.diche-project.eu/resources

best practices and education tools for teachers.

Fig. 1 - The menu of teaching scenarios of the DICHE project.

The menu's target users are primary and secondary school teachers, together with museum educators, who want to design, create and evaluate innovative programs for students aged between 10 and 14 years, in formal and informal education contexts. The description of teaching practices and digital tools is available in English, Italian and Dutch, to increase the number of potential users.

Research can be carried out by either selecting options inside the menu and typing keywords or filtering the different types of resources (teaching scenario or digital tool), uses (tracking, mapping, routing; presenting, reporting; exploring, researching, inquiring; instruction, assignment; recording, collecting), contexts (classroom; museum; heritage site; home) or the language of the digital resources (app, software, website).

The database can also be accessed to read its contents and/or to adapt them to the educational needs of the real-world context of use, and of the tools available.

The menu of teaching scenarios was used during the project pilot phase by Italian and Dutch partner institutions to assess the database effectiveness, the theoretical structure of reference for the project and also the impact of the teaching scenarios created by in-training teachers.

In particular, Roma Tre researchers developed a specific tool for the pilot phase: the *MuseTech* webapp and an evaluation questionnaire for the DICHE Menu.

MuseTech[4] webapp

The name of this web application derives from the combination of the words "museum" and "technology" which represent the foundations of the

[4] Available at: http://www.musetech.it

DICHE project. The idea of designing a web app came into being from the need for a single application which could be used on different mobile platforms and operating systems, without the need to be installed on devices and/or continuously updated. By simply accessing the Internet, MuseTech allows users to enter the DICHE menu of teaching scenarios and, simultaneously, to evaluate and share their contents.

The introduction of a social dimension in the project is indeed a value which MuseTech adds to the menu: an increasingly higher number of users can be reached, the audience gets wider and wider, and this creates a network of researchers, teachers, students and museum educators / pedagogists / education professionals in general orbiting around the project tools and practices. Like other famous web apps and Internet services (such as, among others, TripAdvisor® and Yelp!®), MuseTech allows users to vote for the contents they find in the menu and like the most, thanks to a five-star rating system. Moreover, users can share the contents they voted for on social media platforms such as Facebook®, Twitter®, and Google+® which favor communication and interaction within the community.

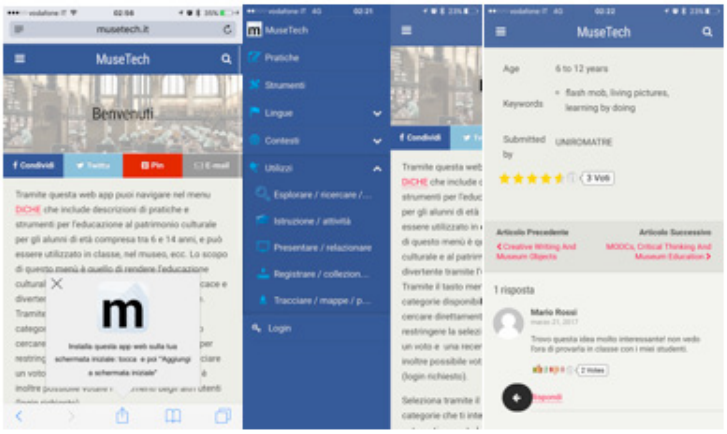

Fig. 2 - Screenshots of MuseTech web app.

MuseTech was used by in-training teachers of the degree course in Primary Education Sciences and by primary school teachers Roma Tre University involved in the project pilot phase, as well as by all participants in the events Roma Tre researchers organized for dissemination purposes. Using the MuseTech app, teachers and in-training teachers had the possibility to promote their critical evaluation skills, reading, voting and giving feedback on innovative teaching and learning paths in the field of Museum Education

and heritage fruition. They also took part in teaching communities discussions and interacted to analyse teaching methodologies, innovative teaching and learning tools, culture and heritage education contexts.

5 Analysis of Results and Findings

In order to assess the impact of the DICHE resources and of the MuseTech webapp the research group created a *corpus* made by the comments inserted by the users. The table below lists all the resources included in the webapp and summarizes the quantitative evaluation that users expressed while evaluating the tool.

The size of the corpus is 122,962 words, of which 6,762 unique tokens.

Table 1
MUSETECH RESOURCES AND THEIR EVALUATION RATES

Resource/Teaching scenario Title	1 star	2 stars	3 stars	4 stars	5 stars	avg stars	# of comments
SMartART	0	0	4	10	21	4,5	31
Digital Storytelling	0	0	2	7	3	4,1	9
MOOVLY - animated videos and presentations	0	1	1	9	3	4,0	18
Heritage App	0	2	0	4	3	3,9	5
News school report - creating and writing a news report, supported by BBC	0	1	2	3	9	4,3	16
StoryWriter - A digital tool for collaborative storytelling	0	0	2	4	1	3,9	7
Audacity - Free software for audio recording	0	0	0	2	2	4,5	4
WeVideo - Cloud-based video creation platform	0	0	2	1	2	4,0	4
InHerit, heritage interpretation course materials	0	0	2	3	3	4,1	7
Kamp Amersfoort	0	0	1	1	4	4,5	5
Scatt-Arte - Photos of art	0	1	0	0	10	4,7	11
Augmented Reality for orientation	0	0	0	2	0	4,0	4
Toolbox with 4 basic Heritage tools	0	0	0	1	0	4,0	1
Radio Local - make a radio report of a local interesting place	0	0	2	2	2	4,0	9
Around the church - making an animation after local church visit	0	0	0	0	6	5,0	9
Participatory mapping with Story Map	0	0	1	2	1	4,0	5
Edublogs - The largest education blogging platform on the web	0	0	0	0	2	5,0	2
Popplet – A mind-map tool to organize ideas	0	0	0	3	2	4,4	7
Answer Garden – A minimal feedback tool to get attention	0	0	0	0	0	0,0	1

Resource/Teaching scenario Title	1 star	2 stars	3 stars	4 stars	5 stars	avg stars	# of comments
Newsela - Online reading platform to develop critical thinking skills	0	0	0	2	3	4,6	8
Huntzz - Treasure hunts and tours across the UK and Europe to experiment gamification	0	0	0	0	0	0,0	0
My Culture Quest – An interactive site to travel across the world	0	0	0	0	3	5,0	5
SMARTART: When the Images Speak of Art	0	0	0	2	3	4,6	4
The history of a village comes to life	0	0	1	1	0	3,5	2
Present history your digital way!	0	0	0	0	0	0,0	0
Use of Padlet in a lesson about the Dutch East Indies	0	0	0	0	0	0,0	0
CSI Leiden - film report of 18th century crime in Leiden	0	0	0	0	0	0,0	0
The Internet Archive	0	0	0	0	1	5,0	2
The Michelangelo project, an overview of the European Fine Arts	0	0	0	0	0	0,0	0
Dutch Arts and Culture Search Engine	0	0	0	0	0	0,0	0
TimeGlider: creating timelines	0	0	1	0	1	4,0	0
Capzles: social storytelling	0	0	0	0	0	0,0	0
Minecraft, create your own world	0	0	1	0	0	3,0	0
12 art and culture lessons for Audiovisual education and Media-art	0	0	0	1	0	4,0	0
Powtoon	0	0	0	2	0	4,0	2
Boomwriter	0	0	1	1	1	4,0	3
Kahoot!	0	0	0	1	3	4,8	4
Thinglink	0	0	1	1	0	3,5	3
Between museums and creativity	0	0	0	1	1	4,5	1
Rijksstudio - discover the possibilities with masterpieces from the Rijksmuseum Amsterdam, Netherlands	0	0	1	0	0	3,0	0
Lupus in Fabula! Discovering animals in Ancient Rome	0	0	1	2	1	4,0	2
Mass communication in Roman Times	0	0	1	0	1	4,0	1
Aqueducts and Baths	0	0	0	1	0	4,0	0
The "Tablets" of days gone by	0	0	2	0	0	3,0	1
The Techno side of Empire	0	0	1	1	0	3,5	3
Gods for a day	0	1	14	68	58	4,3	152
Solve historical riddles through Kahoot!	0	1	9	44	58	4,4	126
MOOCs, critical thinking and museum education	0	2	33	91	42	4,0	185
Recreating artwork through Flash mobs and living pictures	0	0	11	56	118	4,6	208

Resource/Teaching scenario Title	1 star	2 stars	3 stars	4 stars	5 stars	avg stars	# of comments
Creative writing and museum objects	0	5	41	79	39	3,9	183
The Critic Globus experience	0	2	20	52	74	4,3	169
Object Based Learning and 3D Printing	0	2	13	69	63	4,3	171
Travelling Planetarium	1	1	20	66	105	4,4	220
Europeana	0	7	43	47	25	3,7	137
Art Stories FACES	0	8	51	57	39	3,8	177
ArtPlanner - creating a trip planner	0	4	24	77	56	4,1	184
Cardboard, a VR app for Android smartphones	2	3	34	34	25	3,8	116
SMARTART – WHEN THE IMAGES SPEAK OF ART	1	3	23	63	46	4,1	160
TOTAL	4	44	366	873	840		2384

In the app 2127 votes were collected (5 stars rating system) divided as follows: 4 votes for 1 star rating, 22 for 3 stars rating, 366 for 3 star rating, 873 for 4 stars rating and 840 for 5 stars rating.

The DICHE resources, accessed from the MuseTech webapp, were basically marked with a very high rating: the lowest rated resource, with at least 10 votes, was "Europeana" with an average rating of 3,7 stars; the most voted resource was "Scatt-Arte - Photos of art" with an average rating of 4,7 stars. The most commented resource ("Travelling Planetarium") obtained a reasonable 4,4 stars rating in average.

The following list instead summarises the characteristics of MuseTech webapp in terms of number of resources, commenters, comments, votes and level of rating:

- number of resources: 58
- number of unique commenters: 204
- number of comments: 2384
- average number of comments per commenter: 12
- average number of comments per resource: 41
- total number of votes: 2127
- number of 1 star votes: 4
- number of 2 stars votes: 44
- number of 3 stars votes: 366
- number of 4 stars votes: 873
- number of 5 stars votes: 840
- resource most commented: Travelling Planetarium (220 comments)

Most frequent words used in the comments are: "a lot" *molto* (1746); "interesting" *interessante* (1293); "children" *bambini* (1098); "way" *modo* (740); "useful" *utile* (579). These words are very generic and not necessarily related with education (except for "children"). We decided then to look for specific words related to museum education: "museum" *museo* (249); "art" *arte* (473); "cultural" *culturale* (198); "culture" *cultura* (139); "visit" *visita* (251); to technology: "technology" *tecnologia/e* (221); "technologic" *tecnologic** (34); "smartphone" (66); "digital" *digitale/i* (195) to initial teacher training: "education" *educazione* (4); "student" *alunn** (274) or *student** (535); "training" *formazione* (17); "teacher" *docent** (121) or *insegnant** (78); "school" *scuola* (196).

Afterwards, we defined the most frequent segments containing these words. For example, particular interest was paid to identify segments containing the word "training" *formazione*: in some cases, it was used with the meaning of "training"; "Open and online training is a great opportunity" *La formazione aperta e online è una grande possibilità*; in other comments, it was used with the meaning of "formation", "the formation of critical thinking" *la formazione del pensiero critico*. As expected, words from the same semantic ontology are recurring more frequently together: for example, "museum" *museo* and "visit" *visita* are strongly related, since they appear in the same segment 74 times as shown in the figure below.

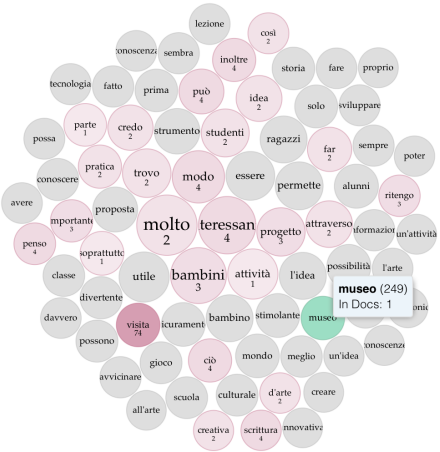

Fig. 3 - Recurring words in users' comments related to "museum" museo.

The analysis of the comments pointed out that the users found the proposed teaching scenarios and resources very interesting and their comments highlighted

also that the connection between museum, technology and heritage education is strongly understood and appreciated. The high number of comments and votes demonstrates the wide use of the app and their high involvement in activities of analysis and evaluation of innovative learning paths.

Unfortunately, comments did not provide with the evidence that possible evaluation is connected to their effective use in initial training of teachers. More results in this sense are available in the following paragraph which presents the results obtained from DICHE menu evaluation survey administered on purpose.

5.1 The evaluation survey

After the use of the MuseTech webapp, an anonymous evaluation questionnaire was proposed to the in-training teachers to assess the quality of the DICHE resources and of the DICHE menu itself. We obtained 425 filled in questionnaires, with an average answering time of 18 minutes and 51 seconds. Due to limited space, only the results of the closed questions are shown below.

The questionnaire was organized in three activities: the first one, the introductory one, had as a main objective to assess the impact and the usefulness of the DICHE menu itself. As far as this activity is concerned, the first 5 minutes were devoted by each respondent to explore the menu, and only after such a time, the respondent was able to access the survey questions. The respondent was asked to provide, on a 5 points Likert Agreement Scale, an agreement value to the following sentences:

- It is clear to me what the menu provides (I don't agree 3%, I somewhat don't agree 10%, I somewhat agree 61%; I fully agree 26%);
- The menu looks attractive (I don't agree 3%, I somewhat don't agree 50%, I somewhat agree 32%; I fully agree 15%);
- This menu is useful for me as a teacher (I don't agree 1%, I somewhat don't agree 57%, I somewhat agree 7%; I fully agree 35%).

Looking at the percentages, it appears clear that the DICHE project menu rationale is very manifest (87% of respondents agrees or fully agrees) but more than half of the respondents did not like the graphical design of the menu (53%) and the 58% of interviewed in-training teachers did not found the menu useful for their daily work.

Then the following two open questions "Which digital tools or practices would you like to add to the menu" and "I would like to make a suggestion to improve the menu" were proposed.

The second activity, called "Value of the tool", was described as follows: "Find a digital tool that will suit the project/lesson that you carry out. Then answer all questions on a scale: don't agree/agree somewhat/ mostly agree/

fully agree". Findings are reported below:

- The search filters are adequate (I don't agree 2%, I somewhat don't agree 11%, I somewhat agree 74%; I fully agree 13%);
- The results are irrelevant to my search (I fully agree 3%, I somewhat agree 21%, I somewhat don't agree 45%; I don't agree 33%);
- It was difficult to find a suitable tool (I fully agree 2%, I somewhat agree 24%, I somewhat don't agree 55%; I don't agree 19%);
- I found a suitable tool that I would like to use (I don't agree 2%, I somewhat don't agree 7%, I somewhat agree 67%; I fully agree 24%);
- There is enough choice (I don't agree 1%, I somewhat don't agree 11%, I somewhat agree 57%; I fully agree 31%);
- Many of the tools in the menu are familiar to me (I don't agree 11%, I somewhat don't agree 44%, I somewhat agree 36%; I fully agree 9%);
- The description of the tool is unsatisfactory (I fully agree 5%, I somewhat agree 21%, I somewhat don't agree 51%; I don't agree 23%);
- The information provided about the tool inspires me to use it in my teaching practice (I don't agree 2%, I somewhat don't agree 11%, I somewhat agree 54%; I fully agree 33%).

Numbered Basically, the menu was positively evaluated by the respondents: most of respondents agreed that the search filters were adequate (87%), the results were relevant to what they searched (78%) and that it was not difficult to find a suitable tool (74%). Almost 9 out of 10 respondents agreed on the possibility to find a suitable tool to use (91%), that the information provided inspired them to use the tool in their daily work (87%) and that there was enough choice in the menu (88%). 74% of the respondents did not agree with the fact that the description of the tool was unsatisfactory and more than the half of them (55%) were not familiar with the tools in the menu.

Then three open questions were proposed: "What I liked most"; "What I liked least" and "I would like to make a suggestion to improve the tools section of the menu".

The third activity, called "Value of the practice", was devoted to assess one practice in particular. Four practices were chosen and randomly allocated to each respondent:

- Digital storytelling (99 respondents)
- *SmarArt* (95 respondents)
- The History of a Village comes to life (106 respondents)
- *Radio Local* (97 respondents)

Then each respondent rated the following statements related to the practice

singled out:

- This practice is inspiring
- The description is complete
- The language is clear
- The explanation is comprehensive
- I can imagine how this practice can be applied
- The use of digital tool(s) adds value to this practice

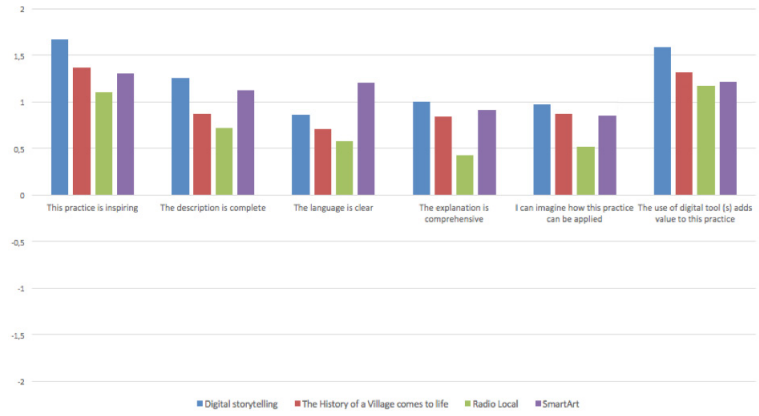

Fig. 4 - Rating of the statements for each practice singled out.

The generally very positive evaluation of the menu and webapp contents make the researcher confident that the quality of the materials is acceptable and adequately used for teacher training, both in terms of pedagogical consistence and digital innovation. The in-training teachers had the opportunity to be faced with activities of analysis, critical evaluation and commentary of teaching scenarios and digital tools, thus promoting transversal communication skills and digital literacy.

Discussion and conclusive remarks

The rationale at the basis of the activities carried out within the project was primarily that of informing in-training and initial in service primary school teachers about new education practices which include a critical use of technology and its effectiveness in learning. Issues concerning the use of new technologies in teaching and learning have called the attention of policy makers and educators at global level in recent years. As already mentioned, expensive technology equipment is useless if teachers are not trained in digital tools employment within their teaching and learning activities. As for as the

core content of the project is concerned, the Italian Ministry of Education in 2012 guidelines for primary school stresses the importance of studying arts and cultural heritage in the early years of schooling.

All taken into consideration, the Roma Tre research group developed the digital menu and the web app described and carried out the analysis reported above.

As shown from results, the idea was that of facilitating in-training and early in-service teachers in the awareness and critical use of technology in their teaching and learning especially as far heritage education was to be integrated in their classes. The activities designed for in-training teachers aim also at promoting educators' professional skills in general, teaching and learning paths design and assessment procedures project in particular. The use of digital tools and the integration of digital literacy in everyday activities are to be conceived as a life-long learning approach, both for in-training teachers and their (future) pupils.

The DICHE menu was generally appreciated by the in-training and prospective teachers. Moreover, the MuseTech webapp pointed out the possibility of the use on-the-go of the DICHE menu, plus a social sharing module and 5-stars voting system that were absent in the original menu. The rating system highlighted a very high rate for the majority part of the resources accessed from the MuseTech webapp. Comments analysis confirmed what emerged from the webapp integrated voting system by adding details about respondents' interest in the DICHE resources. In-training teachers were actually given the possibility to test teaching and learning materials suitable for vocational and digital training and, in fact, digital tools and teaching scenarios quality is positively evaluated, as shown from the data described above.

The design of the training activity was meant to facilitate the acquisition of specific knowledge and skills, as far as the digital dimension is concerned, but it was addressed especially to help in-training teachers reflect on the activities proposed and critically evaluate them. That is why the survey itself was delivered according to a specific timing of analysis: first the fruition of the tool, then the questions related to its features and use. As mentioned above, 9 out of 10 respondents agreed on the possibility to find a suitable tool to use (91%), that the information provided inspired them to use the tool in their daily work (87%) and that there was enough choice in the menu (88%). The evaluation activity called "Value of the practice", then, asked each respondent to focus on one practice in particular and this allowed to deepen in-training teachers' reflection and critical thinking skills. The idea in the design of such training programme was to enhance both the horizontal and vertical dimension of the action addressed to professional development.

Besides the results, which highlight a general appreciation of the tool, it is

important to notice that users had the opportunity to know about free digital scenarios and practices that otherwise were completely unknown. Moreover, the possibility for the users to choose a specific scenario or practice according to their actual teaching and learning needs enhances the effect of the potential technology has to empower certain skills both in the educators and in the pupils who participated in the proposed activities.

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