

Training Schools for Conservation of Cultural Heritage: Between Expertise, Management and Education

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Abstract. Training schools make an important feature of the European research landscape, fostering exchange in frontier research, and building basis for further research and development. How the cross-area, management and educational issues can be effectively put together in training schools, and specifically, for the benefit of a multi- and interdisciplinary field of conservation of cultural built heritage? This paper showcases the experience from the first lessons of the COST (European Cooperation in Science and Technology) Action i2MHB (Innovation in Intelligent Management of Heritage Buildings), to examine and suggest tools useful for further multidisciplinary synergies and networks in this and other frameworks.

Keywords: Training school · Conservation of cultural built heritage · Education · Interdisciplinary

1 Introduction - EU Training Schools in the Frameworks of Cost Actions

Training schools are a valuable tool in order to enrich sustainable development. They can be used as a lifelong learning tool or as a fast track to scientific updating. Either use is valuable, with its own singularities, but targeted to quite distinct audiences. According to UNESCO, “Every person, at every stage of their life should have lifelong learning opportunities to acquire the knowledge and skills they need to fulfill their aspirations and contribute to their societies”. The UNESCO’s new education agenda strategic objectives for 2014–2021 encompass three major strategic objectives: (1) Developing education systems to foster quality and inclusive lifelong learning for all; (2) Empowering learners to be creative and responsible global citizens and (3) Shaping the future education agenda [1]. On the other hand, rather than

providing general training or education, training schools should provide intensive training in emerging research topics.

The issue of education and training, along with youth and sport, is addressed in the European Commission through the Erasmus+Programme [2]. Europe recognizes that providing citizens with the necessary skills will allow them to play an active society role and achieve personal fulfillment. The Erasmus+Programme has three major key actions: (1) Mobility of individuals; (2) Cooperation for innovation and the exchange of good practices and (3) Support for policy reform. Regarding training schools key action 1 is the most interesting vector; thus it considers mobility of learners and staff, Erasmus Mundus Joint Master Degrees and Erasmus+Master Loans. Regarding the mobility of learners and staff a Vocational Education and Training (so called VET) traineeship abroad is considered up to a maximum of 12 months. These vocational training schools are set for both apprentices and students. It is mandatory that the vocational training takes place in another country, where trainees are hosted at a workplace (in an enterprise or other relevant organization) or at a VET school (with periods of work-based learning in an enterprise or other relevant organization). Several H2020 projects offer training schools, within their activities, dedicated to early-stage researchers including internationally renowned scientists and leading industrials. These training schools allow young researchers to further training and allow them to acquire new complementary skills in order to enhance their career development (Fig. 1).

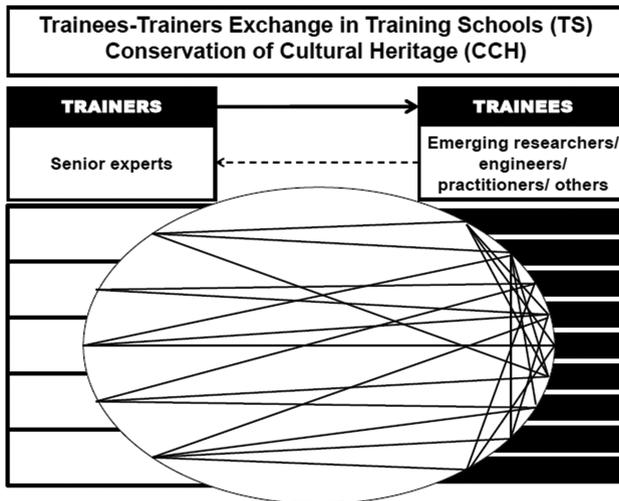


Fig. 1. COST Training Schools: the main focus of trainees-trainers knowledge and ideas’ exchange in Training Schools (TS) in Conservation of Cultural Heritage (CCH) © A. Lobovikov-Katz

European Cooperation in Science and Technology (COST organization) is the longest-running European framework. It has been supporting trans-national cooperation across Europe since 1971 [3]. In its role as the breeding ground for trans-sectoral multi-national co-operation projects, COST delivers the best frame to set an effective platform

to share the knowledge on related research topics. Through COST Actions, COST supports networking activities with particular attention to research training and exchange. The COST Action functions to accomplish a true multidisciplinary effort and consequently intends to overcome the fragmentation within dedicated scientific and technological research field and thus deliver to the young members of the Action a new horizon to nourish innovative flagship initiatives in an international context. COST Actions have several networking tools at their service:

- Conferences
- Workshops
- Dissemination activities
- Short-term scientific missions

These networking tools let researchers improve their ideas by sharing them with their colleagues, providing valuable inputs for their research, career and innovation. The COST Association view of a training school is an instrument that provides intensive training in emerging research topics within the laboratories and organizations involved in a particular COST Action. Their participants are mainly, but not exclusively, young researchers involved in COST Actions. However, training Schools can also cover appropriate re-training as part of life-long learning. In the year of 2014, COST has financed 370 Actions and 367 training schools have been organized [4].

2 Content and Management Outline of the First i2MHB Training School

Currently composed of 36 countries, the COST Association has created a multidisciplinary team of researchers, experts, companies and public administrations of 23 countries linked to various aspects of heritage management, aimed at implementing actions to more intelligently manage heritage. COST ACTION TD1406 Innovation in Intelligent Management of Heritage Buildings Training School took place in Aguilar de Campoo, Palencia (Spain) on January 27th to 29th 2016. This Training School was based on work from COST Action TD1406, supported by COST (European Cooperation in Science and Technology).

COST (European Cooperation in Science and Technology) is a Pan-European, inter-governmental framework whose mission is enabling breakthrough scientific and technological developments leading to new concepts and products, thereby contributing to the strengthening of Europe's research and innovation capacities. Foundation Santa María la Real Historical Heritage is strongly interested in creating awareness of the current challenges of the heritage sector, and here is where this kind of Training School has its origins. Foundation Santa María la Real Historical Heritage, a Project from Castile and León, emerged in 2014 as the result of the union between two reference entities with extensive experience in the field of heritage: Foundation Santa María la Real Historical Heritage. While maintaining the character of its predecessors, the new institution provides services at the national and international level, with its main focus on the study, restoration, conservation and promotion of social, natural and cultural

heritage. The combined efforts of the two participating institutions bring together a wide range of interests and ongoing or past activities, of which more than 500 involve the restoration and enhancement of heritage assets in the nine provinces of Castile and León, as well as at the national level, in different regions.

Triggered by the opening of the COST ACTION call, the necessary efforts for the organization of the activities that would take place during three days were made, and the request to the involved experts for their collaboration was carried out. The next step was the selection of the most suitable trainees, which was accomplished by a board of COST ACTION members. The applicants were carefully selected, on the basis of the motivation letter and CV that they had previously submitted.

English was the second language in the headquarters of Foundation Santa María la Real Historical Heritage during the Training School. 13 students and doctoral students from Spain, and 13 additional ones from different European countries were awarded a scholarship by the European COST association to participate in a training school on innovation in the field of heritage. The Training School enabled the learning of new techniques, methods and advances in heritage management, while working to generate research areas and create networks for specialized contacts.

During the first working day, the participants were able to get close to the Foundation experience in the field of heritage management, as the entity director, Juan Carlos Prieto, explained them how the entity has worked “for more than thirty years on the study, restoration, conservation and dissemination of heritage”. They were told that later, owing to the addition of other entities and administrations, the entity acquired new skills, and evolved from restoration to *preventive* restoration and intelligent heritage management. Projects like Monitoring Heritage System (MHS), installed with success in about fifty buildings, enabled the transition. With regards to MHS, not only were the trainees told how the system works, but Dr. M. Chiriac, the engineer of Foundation Santa María la Real Historical Heritage, explained them how the system was developed, the way the sensors act, and their application in heritage building monitoring.

On the second day, the students had the opportunity to see *in situ* how the system works: they visited MHSLab, an intelligent lab created by Foundation Santa María la Real Historical Heritage, which was established in the Romanesque chapel of Canduela. The objective of MHSLab, as the trainees were told, was to test the effectiveness of different types of techniques and materials used in the field of heritage. They also had the opportunity to get to know the Iberian Peninsula Romanesque Encyclopaedia experience, a true cultural project where more than a thousand researchers have collaborated to catalogue many of the Romanesque remains in the Peninsula. The Encyclopaedia can be found in international bookstores and libraries.

Pedro Martín (OMG), a researcher at Cartif Technology Center, gave a talk of his work on 3D documentation of historic buildings. Marija Damjanović, from Croatia, focused her presentation on the transformation of historic landscapes; and Laura Daví, from the University of Barcelona, introduced her research focus on the monastery of San Cugat del Vallés.

Later that day, the Exhibition Centre ROM was visited, and the Israeli architect Anna Lobovikov-Katz, who had developed a new method to improve heritage conservation analysis through technical methods of drawing, participated as a speaker.

On the third day, trainees learned from the following interventions:

The impact of cultural infrastructures. The case of the Human Evolution Museum in Burgos. Alejandro Sarmiento. Manager of Atapuerca System and HE Museum.

A conference on a Digital Information Model for the Knowledge and Management of Immovable Cultural Heritage. Patricia Ferreira Lopes. Architect. Phd student at Higher Technical School of Architecture of Seville. Research group HUM799 “Strategies for the heritage knowledge”. A talk on Tourism and Heritage: Building Smart Destinations. Juan Vicente Calle Lamelas. Phd student in Tourism. University Rey Juan Carlos Madrid.

The results of the previous day’s practical, conclusions and demonstration of application of Rapid Learning Methodology for Conservation (Preservation) of Cultural Heritage – Understanding through Drawing. Dr. Anna Lobovikov-Katz, Arch., PhD, Technion, Israel.

And finally we ended with a round table discussion on Conclusions of the training school: Challenges for the Early Career Investigators (ECI). During those three days, different topics were addressed: for example, the methods developed by technicians from the University of Belgrade to counteract the effects of earthquakes on heritage, or to fight biological problems affecting conservation. In addition, some speakers explained practical cases, such as the management of Monsalud monastery and the Roman site of Ercávica in Cuenca.

The quality of the Training School was assessed by means of an anonymous survey to the trainees. General results of the survey are shown in Figs. 2, 3, 4 and 5.

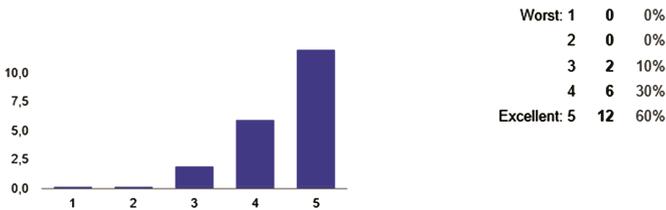


Fig. 2. Q: Did the content and activities carried out in the training school correspond to your expectations?

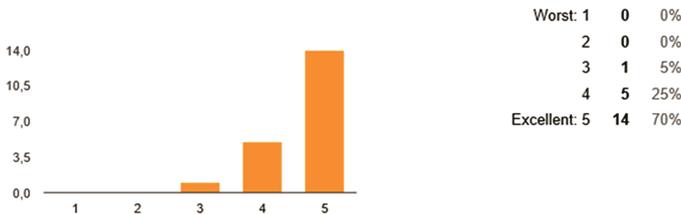


Fig. 3. Q: Did the trainers explain in a clear and concise way the activities in each section?

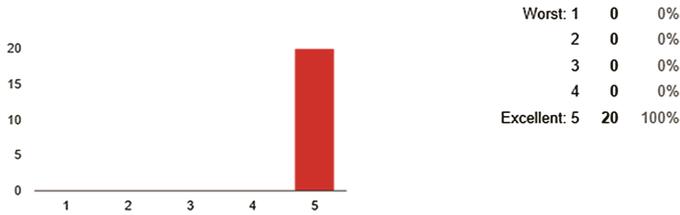


Fig. 4. Q: Were the professionals responsible for the training school close to the students, fostering a good work ambience and participation?

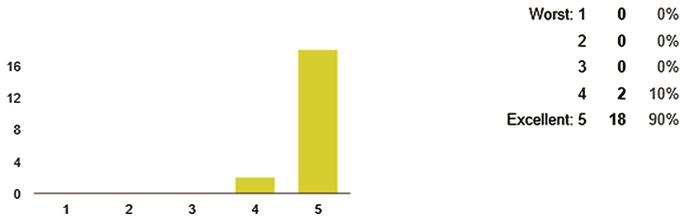


Fig. 5. Q: Were the installations' conditions adequate for the seminar?

Both trainers and trainees of this Training School represent wide range of the areas of knowledge in research and practice within the field of conservation of cultural heritage (CCH).

3 Interdisciplinary Research and Education in Conservation of Cultural Heritage - The Interdisciplinary “Language” for Training Schools (TS)

This section of the paper examines the selected aspects of TS in CCH and their educational value, keeping the following issues in mind:

- Multi- and interdisciplinary character of CCH and CCH training schools
- Main lines of inter-area contributions of education value within the CCH complex
- CCH training schools and contemporary education.

As mentioned in the *Introduction*, training school is an instrument that provides intensive training in emerging research topics within the laboratories and organizations involved in a particular COST Action. This section focuses on the trainee as the main beneficiary of a Training School, through direct instruction. Analysis of the leading role of COST Action management and of local organizers of TS is beyond the scope of this paper, while trainers-related issues are mentioned here merely in the context of trainee-centered analysis.

3.1 Multi- and Interdisciplinary Training in CCH Training Schools

Among many interdisciplinary areas of human activity, the modern field of conservation of cultural heritage holds a unique position, comprising literally the entire spectrum of STEM, SSH and the arts. Training schools in CCH reflect the multi- and interdisciplinary character of this field. Therefore, many organizations involved in a single CCH COST action, usually represent a wide spectrum of STEM and SSH fields, thus adding their input to the interdisciplinary structure and content of COST training schools in general, including those in the framework of COST ACTION TD1406 Innovation in Intelligent Management of Heritage Buildings (i2MHB). Analysis of the COST i2MHB training schools showed a wide range of CCH areas of expertise of both trainers and trainees, along with multi- and interdisciplinary cross-area topics introduced in the school program.

3.2 The Audience

Actors. With a view to contribution to CH conservation through educational activities, several main types of actors and their inter-area contribution can be defined. The following main groups of actors can be delineated:

- CCH researchers
- CCH practitioners
- CCH students
- Non-CCH public of diverse background.

Conservation Community. In conservation of CH, research is an integral part of restoration practice, and at the same time, contribution of education to research in CCH has been examined in several publications [5]. With regard to actors from the conservation community (CCH researchers, CCH practitioners and CCH students), we come up with the following scheme (Fig. 6). It presents a multi-beneficial contribution between and within different departments of CCH-activity (practice, research, education) and CCH-actors (practitioners, researchers, students).

Some inter-area contributions are well-explored phenomena, e.g. a dually-beneficial CCH students-CCH practice exchange. Experience in exposure of learners to actual conservation process in curricula or courses in conservation of cultural heritage, has shown good results [6, 7]. Thus, students contribute to actual conservation of cultural heritage, and at the same time enrich their knowledge and understanding in a way which could be hardly achieved in the classroom, through e-learning. In training schools, combined participation of researchers and practitioners, both on the side of lecturers and trainees, reinforces such exposure to the diverse areas of activities. In long-term education, even in a usual semester course, it contributes to the development of cross-area abilities, which might be of benefit to the main area of interest of a trainee, e.g. a conservation practitioner, exposed to a research project, could develop typical research qualities. According to the COST rules, the duration of a training school ranges between 3 days to one week. This short duration of training schools adds to the intensity of inter- and intra-area exchange between diverse groups of actors involved.

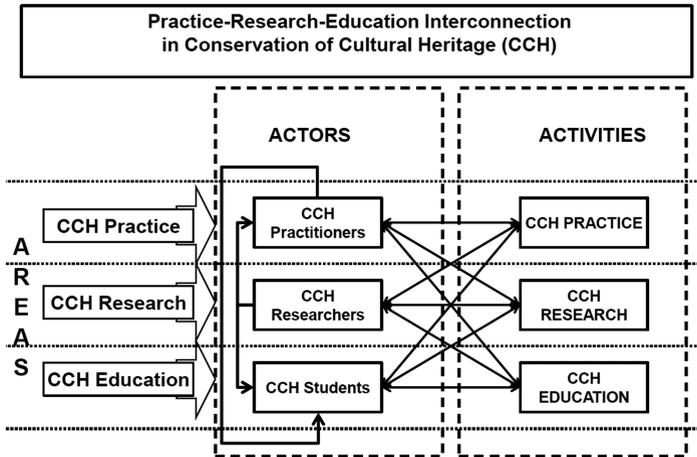


Fig. 6. “Areas-Actors-Activities” scheme: practice-research-education Interaction in Conservation of Cultural Heritage (CCH) © A. Lobovikov-Katz

Non-conservation Public of Diverse Backgrounds. With regard to multiple types of actors in CCH complex, another group should not be overlooked: the non-conservation public. Generally, its members can be subdivided into several sub-groups including (a) general public; students of different levels of education, especially (b) secondary and (c) tertiary levels; (d) non-conservation researchers. The groups “c” and “d” are of particular interest, especially because of inter- and multidisciplinary nature of conservation of cultural heritage. Involvement of sub-groups “c” and “d” (university students and non-conservation researchers) might open new horizons for emerging researchers and engineers, and also contribute to their understanding of interdisciplinary cooperation in the modern reality. CCH learning contributes to understanding of interdisciplinary cooperation in all areas, also those non-related to conservation, among both “c” and “d” groups. Inclusion of non-conservation researchers in the field of conservation of cultural heritage is not a new phenomenon. Their active participation in training schools allows their re-training as part of life-long learning.

3.3 Multiple and Diverse Roles of Trainees in Training Schools

Following good TS practices, and specifically in the course of COST Action MP1004: “Hybrid Energy Storage Devices and Systems for Mobile and Stationary Applications”, 2011–2015, different types and levels of involvement of trainees have been encouraged in the COST Training School in Aguilar de Campoo.

In addition to their usual learning role, young participants can be encouraged to propose topics for lectures and for round tables sessions which might be of interest, chairing the round tables discussions (community of young researchers as a breeding ground for new ideas and approaches). They can be also encouraged to suggest the trainers or “invited speakers” etc. In the COST Training School in Aguilar de Campoo trainees were encouraged to give talks/lectures along with their trainers. These

correspond to one of the main COST ideas - to pave the way for active involvement of young researchers.

Figure 7 outlines multiple optional roles of trainees (versus trainers) in a Training School (TS) which might include their involvement in the planning stage before TS (a), active participation in the TS activities (b), and evaluation of results after the completion of TS (c). Exposure of trainees to planning, and undertaking activities of combined content-management character provides excellent training ground for the contemporary research reality. Performing such diverse roles as trainee and trainer, student and lecturer, allows the TS trainees to widen their horizons, and to improve their learning abilities through active learning.

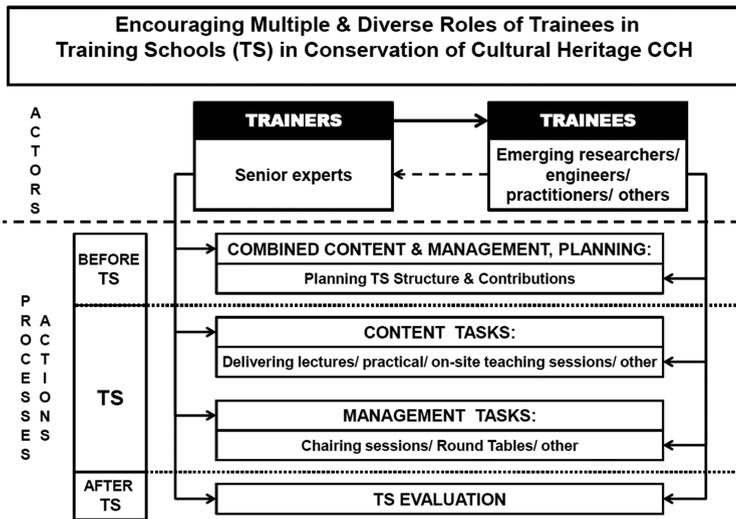


Fig. 7. Encouraging multiple and diverse roles of trainees in training schools before, during and after TS activities © A. Lobovikov-Katz

3.4 Training Schools (TS) and Education

Modern education theory and practice provide a wide range of learning approaches and practices. Several types of learning relevant to CCH training schools can be outlined:

- Class learning activities
- Laboratory
- In-situ learning on historic or conservation sites
- E-learning
- Blended learning (combining frontal instruction with online learning activities).

Bringing TS trainees together in real environment, thus allowing their immediate communication with other trainees and trainers, - is an important advantage of training schools. Therefore, distance learning and e-learning - the innovative contemporary ways of learning - are less relevant to CCH Training Schools. However, blended learning

might be helpful, and especially through the inclusion of online activities before or after the TS period, and in non-virtual instruction which takes place on TS venue. Such delayed-in-time linkage of online and offline learning would be a complex multi-disciplinary education development. In addition, blended learning might be also instrumental for real-time blended learning during TS period, in order to facilitate understanding between trainees and trainers of diverse conservation backgrounds. In this case, on-line tasks might be differentiated to suit the diverse parts of target audience, and involve “flipped classroom” methods.

On-site learning activities are indispensable in CCH, which is in line with innovative development in education of recent decades [8]. Pre-planned combination of “passive” and “active” learning activities in diverse types of learning and in different learning situations, and especially the in-situ learning in CCH research and practice held on heritage conservation sites, can result in innovative results [9].

Training School (TS) in CCH comprises diverse components, and gives trainees a unique access to:

- Diverse types of learning activities (class/on-site/laboratory; active/passive)
- Inter- and multidisciplinary learning material
- Local cultural heritage and its conservation
- Diverse types of knowledge (CCH research; actual CH projects)
- Immediate learning and scientific exchange with senior CCH experts
- Diverse teaching methods showcasing educational trends from different universities and other organizations
- Combining several roles in TS (optional), e.g. learning (trainee), teaching (giving a presentation), scientific management (contributing to a TS planning; moderating a session)

TS goals can be easily formulated as deriving from the contemporary CCH requirements and EU policy in research, education and training. However, the open-end character of TS activities can complicate defining and achieving specific learning objectives. The application of educational theories and approaches, commonly used in “regular” education on different levels, should be specifically adjusted to CCH TS. According to the authors’ experience, TS trainees are often characterized by high learning motivation and multi-disciplinary educational background. These and other data often contribute to effective learning and creative knowledge exchange between trainees, and trainers, and support the overall dynamic character of training schools in the conservation of cultural heritage.

4 Conclusions

The summarizing document of COST strategic Workshop *The Safeguard of Cultural Heritage* pointed out that ‘the need for trans-disciplinary cooperation and training of young scientists to strengthen the European research arena in the field of cultural heritage is a recurrent theme’ [10]. Ultimately interdisciplinary character of modern conservation of CH, involving different fields of science, technology, humanities and arts, tight

connection between research and practice typical of this field, along with often multi- and interdisciplinary profile of CCH experts, have a challenging impact on CCH Training Schools.

Following the continuing development in conservation of cultural heritage, and education, there would be a lasting need for reviewing and re-developing CCH training. Training Schools in conservation of cultural heritage can provide a unique testing ground for improvement and development of training in interdisciplinary research and development outside the CCH domain, and, in turn, contribute to the preservation of the world heritage through training researchers, engineers, architects, archaeologists and conservators.

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