

## Mastering building conservation

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**ABSTRACT:** This article investigates the state of the art and future challenges for building conservation education on the master's level. The main objective is to illuminate the content knowledge, cognitive strategies, and particular skills that are required to master the science of building conservation. The results suggest that traditional professions are being challenged to assume new roles and incorporate new skills. Looking to the future, building conservation education will require an integrated approach that focuses on the skills and expertise for inter-disciplinary collaboration on complex conservation processes.

### 1 INTRODUCTION

Building conservation is the complex process of bringing historic buildings from their present condition and contexts into future uses. Thus building conservation is both a social and a material act of intervention. It is a professional domain that intersects traditional professions. The profession's scope of expertise descends from various academic disciplines and fields of traditional knowledge that coalesce in a common but disputed basis for conservation theory and methodology, codified in legislation and professional organizational agreements and guidelines. Internationally, professionals are trained for leading roles in building conservation mainly through specialization programmes on the master's level.

This article investigates the state of the art and future challenges for building conservation education. The investigation occupies the educator's perspective with focus on academic education on the master's level. The motive for the investigation is an on-going effort to develop a new building conservation master's programme at the University of Gothenburg, and thus one objective is to illuminate the content knowledge, cognitive strategies, and particular skills that are required to master the science of building conservation. The questions for the investigation frame building conservation by triangulating its discipline with education and the labour market: How has building conservation emerged and transformed? Where are building conservation programmes offered, and how do people enter the field? How are educational curricula and profiles defined? What does a degree in conservation mean for a graduate's professional profile? How does the scope of a graduate's expertise match the scope of professional practice? What transformation and trends in the built heritage sector need to be acknowledged to foster professionalism?

The research material for this investigation consists of a SWOT analysis of the Swedish cultural

heritage sector, generated through review of literature, and semi-structured interviews with representatives of organizations in the sector. An Internet survey of building conservation masters in Europe identified about thirty education curricula, which were then analysed. The present research also uses reports from a European collaboration (in which the author participated) on skills, training, and knowledge transfer in the cultural heritage sector.

### 2 HERITAGE CONSERVATION

Heritage conservation professionals have varying degrees of leverage and operate on diverse aggregated levels of planning, management, and intervention. *Building conservation* is used in this article to refer to a field of professionalism within heritage conservation. Buildings specify a scope of practice but also a scope of expertise. From an educator's perspective, conservation of built environments, buildings, or movable cultural artefacts to some extent requires different content knowledge and distinct skill sets. However, heritage conservation professions also share knowledge and skills. They need, for instance, common context-appropriate methods for public engagement and community-led processes and the readiness to interact in the formation and uses of cultural heritage in society.

Heritage conservation is not a study of phenomena with a contemplative position on societal practices. Conservation research is practice-led, or at least well informed by practice, and aims to have a positive curatorial impact on cultural heritage. The research supports society in the sustainable use of heritage, and guides professionals in how to act in complex conservation processes. Professionalism means making the best possible judgement of *what works*. The heuristic professional approach has to balance different contextual modalities and combine various knowledge bases for making informed



decisions (Dillon et al. 2014, Henderson 2011). What works in practice relates partly to scientific evidence but also to situated conditions like managerial capability, legislation, economy, and cultural significance in the particular context. The heritage conservation profession is what David Pye calls a *workmanship of risk*, with no exclusive prerogatives of quality and where the result is not predetermined (Pye 1968). What it has exclusively is an immense range of qualities that depend on judgments and care in the processes.

Building conservation is usually a subordinate academic field of architecture, engineering or archaeology framed with a vague reference to transdisciplinarity. These dispersed conservation units have long been reconciled by a common deontological conservation ethic that today is thoroughly criticised for disregarding heritage as a cultural practice and for using conservation to legitimise and delegitimise cultures (Smith 2006). Conservation has failed to answer to the 'bigger questions' and is not recognised for its potential when society addresses the challenges of sustainable development. This calls for a change (Heritage & Golfomitsou 2015). Educating professionals in conservation is foremost an act of intention—how to make the most positive impact on cultural heritage in the future.

### 3 SWEDISH BUILDING CONSERVATION IN THE REAR-VIEW MIRROR

In retrospect, the role of building conservators has changed and so have their knowledge and skills. In the early conservation movement, the professions were not yet distinct. A building conservator was regarded as having the aesthetic expertise to restore a monument's unity of style. The 20th century brought a pervasive professionalization to essentially all domains of working life. In the field of cultural heritage, architects took the leading positions in building conservation (Wetterberg 1992). The roles of an antiquarian were diversified but assigned mainly to museums (in Sweden the title of antiquarian combines cultural historical expertise with an operative societal function in regard of cultural heritage).

The 1960 Venice Charter for the Conservation and Restoration of Monuments and Sites advocated a multidisciplinary approach to building conservation, and encouraged the heritage sector to recognize not only singular artistic monuments but also common settings and modest vernacular works of the past. The heritage sector in Sweden transformed during the 1970s from a narrow and museum-centred sector to an integrated factor in urban and regional planning. Building conservation was established as a field of expertise at the new regional museums, and the governmental county administrations installed units for cultural

environments under the leadership of a county antiquarian (Johansson 2011).

The transformation of the sector also called for a new kind of education. In 1978 the University of Gothenburg started a programme in *integrated conservation* on the scale of built environments. A key reference was Donald Appleyard's book *The Conservation of European Cities*, which argued for an integrated conservation approach to amend the curatorial cross-sections of social and physical planning (Appleyard 1979). The students who graduated from the programme took positions in regional museums and county administrations, but also in the municipal agencies. Their initial assignments were to inventory built environments for local and regional authorities and to assess their values for listing and protection (Lagerqvist et al. 2014).

In 2001, the Swedish National Heritage Board launched the programme Agenda Cultural Heritage, which aimed to discuss the sector's conception of cultural heritage and to develop the experts' roles toward more participatory working methods. This ideological turn led to a sharper focus on the uses of heritage in society and of heritage meanings for communities of interest (Wimar 2008). In parallel with this ideological *turn away from protection*, building conservation has grown as a market through the *offspring of protection*. The built heritage sector has spawned legislative means, administrative infrastructure, and also subsidises to support the protection and conservation of historic buildings.

In retrospect, it may seem as a progressive transformation from material-based, to value-based and to a present people-based conservation approach. In fact, all these approaches are still in use, and still demanded. There is currently a gap between the different building conservation approaches.

### 4 THE SWEDISH BUILT HERITAGE SECTOR IN TRANSFORMATION

The recent growth of enterprises specialised towards building conservation is notable. A recent survey identifies about 1,200 building conservation enterprises (Larsson 2017). In general, refurbishment occupies an increasing share of the building sector. Since 1997, investments in the renovation and repair of the Swedish building stock has increased steadily, now reaching more than half (51%) of the total workload. A study of the sector by the Architects' Council of Europe (ACE) demonstrates that the balance in Europe is tilting toward refurbishment with a 59% share (Mirza & Nancy Research 2017). Parallel with the increase in refurbishment, the rate of demolition of existing buildings in Sweden has decreased. In 2014, the demolition rate reached its lowest point since data collection began in 1949 (SB 2015:22).

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### 5 THE ANTIQUARIAN CONSERVATION

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Data on the age and properties of the building stock says something about the need for building conservation. About 12% of Swedish buildings predate 1919, and 14% are from the period 1919–45 (Meyer et al. 2009:540). A two-thirds majority of the building stock from before 1930 are small houses commonly built of wood (BI 2015:21). The largest portion of the building stock dates to 1945–1970, but the most urgent need for maintenance and refurbishment is for buildings from the period 1961–1975. Approximately 650,000 Swedish apartments from this period are in urgent need for refurbishment (BI 2015:19). These buildings consist to a large extent of concrete structures and industrialised building elements. The majority of protected buildings are listed through municipal planning and local legislation. The municipalities in Sweden estimate that 1–2% of their buildings are listed as culturally significant, which would amount to as many as 152,000 listed buildings. There is better data on historic buildings with national protection. 2,459 buildings and environments are protected by national law, of which only 265 are owned by the state. Moreover, there are 43 cultural reserves, mainly historical agricultural landscapes, and 15 world heritage sites. The Swedish National Property Board (SFV) manages the majority of the state-owned historic buildings and receives particular subsidies of up to 33.5 million euros annually to cover the economic disadvantages of cultural protection. The county administrations receive 23.8 million euros in subsidies for conservation of both listed and non-protected built environments, including maintenance of the over 600,000 ancient monuments and archaeological environments in the country.

Sweden's churches have a particular infrastructure for protection and conservation. Since the Swedish church separated from the state, the church is the nation's largest civic association, comprising over 5 million members. The churches are considered a national cultural heritage, and the national government subsidises church conservation with 45.6 million euros annually. Church conservation is a large business that requires expertise in traditional building materials and methods, such as masonry walls, lime mortars, and tarred wooden shingles. In conclusion, the potential market for building conservation professionals is extensive and covers a wide variety of conservation object types, from old masonry churches to log timber structures and concrete apartment buildings.

## 5 THE TRADITIONAL PROFESSIONS AND THE MAIN ROLES IN THE CONSERVATION PROCESS

This section investigates the different roles and leverage held by professionals in the building

conservation process. The motive is to foresee possible target groups building conservation master education. The traditional roles of the architect, engineer, antiquarian, conservator, and craftsman have all changed, and each of these can now serve as a professional building conservator. Rather than focusing on these traditional professions, a more relevant approach would be to base our analysis on the roles and uses of skills in the conservation process. Here the main responsibilities are tentatively grouped into the following roles: *performers, contractors, conservation (law enforcement) officers, consultants, and developers or trustees.*

The hands-on experts such as masons, carpenters, and mural-painting conservators form a group of performers that take direct action through material interventions. The performers are the group that makes the biggest impact on the final result, spending the most time at site in contact with the building as a primary source and making countless decisions during the conservation process. The basic education and training of construction workers have no mandatory course in building conservation. Craftspeople with conservation skills are normally trained at the job. There exist educational programmes for craftspeople in traditional techniques and conservation separately from the conventional building construction education, some also in higher education. These craftspeople with specialisation in conservation, through practice or education, could expand their scope of competence through a master education.

Conservators-restorers, like craftspeople, are hands-on performers of conservation. In 1985 the first academic bachelor programme for conservators-restorers was launched. Until that time, conservator-restorers were either specialised craftspeople or artists, and in some cases graduates of foreign educational programmes in conservation. Today, conservators-restorers in Sweden call for continuous professional development, and also to a dedicated master's program, which is required to qualify to the European Confederation of *Conservation Restorers Organizations (ECCO).*

The conservation officer is a professional role in a public agency at the local, regional, or national level with responsibility to monitor and supervise the legal aspects of the conservation process. Traditionally the conservation officer has an antiquarian background. Conservation officers at the county administrations produce in total 166.5 annual work units (or full-time job equivalents) to manage over 19,000 errands (MK 2016:54). The regional museums have traditionally been important employers of conservation officers, but increasingly the role of monitoring and supervising in building conservation has turned into a private market for consultants. Since 2006, the National Board of Housing, Building and Planning (Boverket) demands that someone with a certificate of



building conservation expertise (*antikvarisk sakkun-  
nig*) be engaged in local building planning whenever  
listed buildings are involved, and this requirement is  
implemented by municipalities through the building  
permit process. The certificate is based on an assess-  
ment of education and experience, combined with  
a shorter diploma course in legislation and build-  
ing permit procedures. There are 169 professionals  
with this certificate, most of them with backgrounds  
working as antiquarians or architects in private firms.  
There ought to be many more. One problem is that  
a majority of the municipalities do not have suffi-  
cient internal expertise in the conservation of build-  
ings and built environments and have identified a  
need for more. The annual Climate Goal Assessment  
(miljömålsenkäten) concludes that 20% of Sweden's  
municipalities do no planning for the built cultural  
heritage. No more than 10% of the 290 municipalities  
employed a conservation officer or someone of equal  
competence, and only 35% had access to or used these  
services, for example in responding to the require-  
ments for antiquarian expertise (MK 2016:55).

Traditionally, the project manager in a building  
conservation project was a specialised architect.  
His or her contribution was to write procurement  
documents and building conservation plans and to  
supervise and make decisions in the building pro-  
cess. Increasingly, private agencies employ antiquar-  
ians who were formerly public officials, and larger  
agencies may have specialised units for building  
conservation (Almevik & Wolke 2018). There may  
be a variety of reasons behind this. The architect's  
role has expanded towards urban and regional  
planning, and their historical perspectives and  
conservation expertise have been compromised.  
Architects are in high demand in the labour mar-  
ket, and unemployment in the profession stands at  
0.6%. Two out of three firms are unable to recruit  
the staff they need (SA 2016:15). While architects  
today lack knowledge of historic building and  
conservation, antiquarians and conservators have  
weak competences in planning and management.

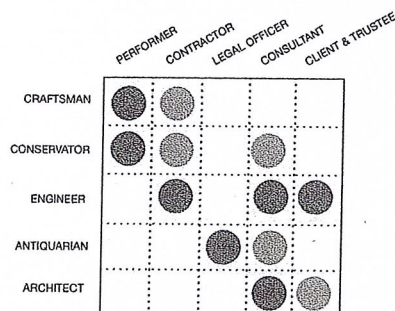


Figure 1. Traditional professions in building conserva-  
tion, and their traditional and emerging roles in the con-  
servation process. The scheme generalizes over the Swedish  
professional field.

There is a large group of specialists working with  
historic buildings but without base line education in  
cultural heritage. Society has increased its require-  
ments for environmental strategies, indoor climate  
control, energy efficiency, accessibility, fire protec-  
tion, noise reduction, working environment, and  
more. The more complex building structures become  
and the more exacting their functions, the more spe-  
cialised consultants are needed. These complex and  
large-scale projects need extremely qualified build-  
ing conservation leadership to coordinate the many  
experts, manage the requirements, and negotiate the  
claims on the building's functions, meanings, and  
matter. A building conservation master could also  
provide these experts with relevant competences.

The most important role in the conservation pro-  
cess, however, may be that of the developer or trust-  
ee. Results may be amended by regulations, but real  
quality requires great ambition, expertise, and money  
from the start. Large-scale developers and trustees  
may have a staff of project managers, facility man-  
agers, estimators, and procurers. The early stages of  
project planning and procurement directs and delin-  
its the process to follow. If certain areas of expertise  
are not demanded by the client early on, they will not  
be present in the project. Public procurement regu-  
lations may seem cumbersome and even counter-  
productive to cultural heritage, but experienced and  
creative procurers may bring out both competitive  
prices and good quality. Hence, a key target group  
for advanced building conservation education is the  
present and future staff of developers and trustees,  
who can play a powerful role in expanding the scope  
of practice for others and augmenting the profes-  
sionalism in the built heritage sector.

## 6 EUROPEAN BUILDING CONSERVATION MASTER'S PROGRAMMES

This section aim to make a review of the situation  
and trends concerning building conservation mas-  
ters in Europe. The outline is by necessity brief and  
general, based on approximately 30 investigated  
cases.

The Bologna Declaration of 1999 initiated a  
process to harmonise European higher education  
to facilitate students' mobility and employers'  
recognition of their credentials. There are varia-  
tions within the framework, but in most cases it  
takes three years to earn a bachelor's degree in the  
first under-graduate cycle, another two years for a  
master's degree in the second, and additional three  
years for a post-graduate doctoral degree in the  
third cycle of education.

From a European perspective, building conserva-  
tion is separated between academic education for  
officials and vocational training for craftspeople.  
The craftspeople are regularly not recognized as



designated for leadership in building conservation. Academic careers in building conservation crafts are found in Sweden (University of Gothenburg), Norway (Norwegian University of Science and Technology), and Estonia (Viljandi Culture Academy, University of Tartu). Consequently, craftspeople in these countries may also hold positions of leadership. Even though the majority of craftspeople will stop at the traditional vocational training and work in traditional roles with hands-on treatment, the exiting opportunity for an academic career lends professionalism and appeal to the trade.

Building conservation in the European countries is most frequently offered as a specialisation on the master's level. Concurrent bachelor's degree programmes in building conservation are unusual. The master's degree concept is used for various types of programmes, from an *integrated masters* that may include undergraduate courses to a 'master of a master' that requires a graduate degree for admission to the course or programme.

An essential distinction should be drawn between a 'taught master's' and a 'research master's', where the former may be only one or two terms of study. A conservation master's is a degree in science or technology (MSc) or in the arts (MA). The Master of Arts is commonly offered by departments in the humanities, as for archaeology. Many universities in Europe have partnerships by which they offer the students a double master's, whereby a student may earn two master's degrees using the same thesis for different departments in partnership.

The British building conservation master's regularly offers students the ability to finish their studies at different levels of progression, with a *Postgraduate Certificate* (PGCert) after one term of study, a *Postgraduate Diploma* (PGDip) after two terms of study, or with the final Master's Degree after completing a thesis. The combined master's with certificate and diploma courses is used mainly in *Continuing Professional Training* (CPD) targeting professionals already in the midst of their careers. In the rest of Europe, the master's regularly consists of two years of full-time study.

The admissions requirements for a master's in building conservation vary widely. The shorter British master's targets working professionals and requires 'a good honours degree', which is equivalent to a bachelor's in architecture, civil engineering, building and surveying, historic archaeology, or equivalent professional experience and/or qualifications. The longer cohesive master's in Europe is often designed to encompass the institution's own undergraduate programmes, although they may have other admissions requirements. A career in building crafts is not considered, or at least not articulated, as a relevant factor in admissions.

It is worth noting that the institutions that offer educational programmes for conservator-restorers

of artworks and cultural property are not the same as those that educate building conservators. There seems to be a strict distinction between the conservator and the building conservator somewhere along the lines of the building's surfaces and interiors. Among the members in ENCoRE, only a few institutions have programmes in both building conservation and object conservation. Object conservation programmes commonly relate to fine arts, while building conservation programmes relate primarily to architecture, civil engineering, or occasionally to archaeology. In southern European countries, building conservation master's programmes are most commonly offered at schools of architecture, while for instance Germany many times offers building conservation at universities of applied science. These *Fachhochschulen* (FU) are also oriented to working professionals, with internships and teaching professionals, and generally don't award doctoral degrees.

It is standard with few exceptions that building conservation is a teaching subject and not a prominent research field. The integration of research with teaching is not prominent. The conservation field is presented as interdisciplinary, but foremost as a professional field. There are exceptions, such as in Leuven, where master's students receive credits for participating in research seminars, or the architectural conservation master's at La Sapienza, which offers a distinguished research course in tools and methods for historical research.

A common pedagogical approach is to connect education to practice. Education in building conservation frequently involves in-house training and problem-based assignments in real conservation projects or simulated cases that set out from real buildings. Many programmes have established collaborations with trustees or conservation workshops linked to long-term projects or world heritage sites, where students and professionals interact to solve real problems. The University of Bath has a series of courses formulated as case studies connected to current projects in the region. Even though learning through practice is common, the practice-led pedagogy and research approach is rarely articulated.

The master's programmes in Europe have to a large extent similar course content. Standard course themes are principles, theory and history of conservation, surveying, recording and documentation of buildings, architectural history and historic building types, building materials and deterioration, structural analysis and conservation techniques, and design-driven restoration and transformation. Some institutions have profile courses such as energy efficiency or conservation finance and economics. There are also master's programmes with distinguished profiles, such as the University College of Dublin, Ireland with a master's in *World Heritage Management and Conservation* or the University of Turin,





Figure 2. A tentative model of heritage conservation approaches and intersections with traditional fields of knowledge. The model is generalized. There are overlaps and exist also other academic positions.

Italy with a master's in *Cultural Property Protection in Crisis Response*.

Even though it is more and more common that the professional role includes the expertise to design for and facilitate participatory activities in the conservation process, few institutions emphasise participatory methods. Furthermore, digital technology is seldom put to the fore. There are some institutions that provide courses in digital documentation and building information modelling, but considering the demands for digital expertise in professional life, these skills seem underdeveloped.

A general observation is that the course structure and approach to building conservation depend on the kind of faculty the programme belongs to. The schools of architecture have a design-driven approach, while technological institutions often focus on the structural aspects of the building. Architecture and civil engineering focus more frequently on conservation planning, while the applied sciences are directed more towards preventive conservation. Building conservation within the humanities is not common, but the programmes that do exist frequently emphasise the general aspects of cultural heritage and integrated approaches to conservation. As previously mentioned, craft programmes directed towards historic building traditions exist in the Nordic countries but not on the master's level. The conservation aspects of the academic craft programmes primarily concern traditional craftsmanship as intangible cultural heritage. Programmes in building crafts and conservation master's oriented towards artworks, cultural objects and architectural surfaces share the craft aspect of the hands-on conservation treatments.

## 7 THE SWEDISH CASE

This section outline existing building conservation education in Sweden. Historically, restoration, historic constructions, and traditional building techniques and materials were mandatory subjects in the Swedish schools of architecture. In recent years, the architect's role has changed and education has expanded the scope in other fields (Caldenby &

Johansson 2016). Architecture and civil engineering have merged at the organisational level, thus also affecting the structures of knowledge management. Educational programmes in building engineering, environmental engineering, and sustainable infrastructure, or in real estate and construction management have no mandatory conservation element in the curricula. Considering the fact that 51% of building activity in Sweden is refurbishment, the low priority given to conservation is remarkable.

However, greater priority is a general trend in European architecture programmes, where mandatory conservation related courses represent at average 3–6 credits in second—and third-cycle education. Italy stands out with up to 26 credits in building restoration and conservation planning (Cabrera 2017).

There are two master's programmes in heritage conservation in Sweden—one at the University of Gothenburg and another at the Gotland Campus of Uppsala University. The master's in Gothenburg is an open programme with a few mandatory courses in integrated conservation, conservation history and theory, and sustainable conservation. The Master's in Cultural Heritage and Sustainability at Campus Gotland aims at 'professional, analytical capacities in areas such as heritage conservation and management, international relations and development with a focus on heritage issues'. The Royal Institute of Arts offers a one-year post-graduate course in architectural conservation. Admissions requirements include a degree in architecture or equivalent and at least one year of professional experience. A key pedagogical component is the dialogue and exchange among the experienced participants. A more recent initiative is the Nordic Master's in Architectural Heritage at the Aarhus School of Architecture in Denmark. This programme has a high tuition fee, which distinguishes it from those in most Nordic countries that are free of charge for European citizens.

Building conservation in Sweden is primarily provided in undergraduate programmes. There are several craft-based programmes within Folk High Schools (EQF level 4) or Higher Vocational Education (EQF level 5), but these formats are fluid. The governmental funding for Higher Vocational Education (HVE) is normally provided only for two rounds of an education. There are today four bachelor programmes related to building conservation in higher education.

The programmes in Integrated Conservation of Built Environments (180 ECTS) and Building Craft (180 ECTS) are both given at the Department of Conservation, University of Gothenburg. *Integrated Conservation of Built Environments* has a strong focus on conservation planning grounded in content knowledge in the history of built environments. The programme fosters critical heritage perspectives as well as cultural heritage management



skills. Building history and conservation is well represented in the curriculum but not on an advanced level. The *Building Craft* programme started as HVE in 1997 and developed into a higher education programme in 2006. The programme offers specialisations in masonry and woodworking, with practice-based courses in various traditional techniques and materials as well as related methods for conservation and repair. Generic courses in documentation and management are provided, but only to a basic level of understanding. The *Building Conservation* programme (180 ECTS) at Campus Gotland, Uppsala University is the one undergraduate degree programme in Sweden that directly focuses on building conservation. The programme *Furniture Making and Building Crafts* (120 ECTS) provides comprehensive education in various woodcrafts, including techniques in furniture making and building interiors. The students get a basic overview of the history of buildings and artefacts and primarily project-based experiences in conservation methods.

So far, the students from these programmes have been fairly prosperous in the labour market. However, the competition for holders of bachelor's degrees has hardened, and good opportunities for mobility, careers, and leadership require a graduate degree. In the current education system, adapted to the Bologna Convention, a student with a plain honours degree is not qualified for admission to a doctoral degree programme.

The need for developing Swedish master's degree in conservation is a push-pull situation, with both external and internal motivations. Over time, the undergraduate programmes in conservation have followed a general trend of reduced resources for direct education, allowing for fewer practice-based courses, increasing class size, and expanding the role of independent study. Educators have to find new creative ways to design higher education. It seems inevitable that Sweden too will adopt the common approach among European universities, with broad undergraduate programmes with large class sizes and a more diverse offering of master's programmes and post-graduate courses with a greater international and professional orientation.

## 8 MASTERING BUILDING CONSERVATION

This last section will draw general conclusions and discuss some of the key decisions from an educator's perspective. The design of admissions requirements is a balance between maintaining a consistent progression from bachelor's to master's programmes and ensuring a broad and sustainable recruitment of students. The master's students may come from the school's own bachelor's programmes, transitioning immediately from undergraduate to gradu-

ate studies, or they may be graduates of those same programmes seeking admission to pursue research or advancement in their professional careers. In these cases the curriculum can be optimized in regard to the known content of the undergraduate programme. Another target group could be national or international students with a bachelor's in the same or similar subject, or students with a bachelors degree in for instance planning or business administration, who want to acquire a specialisation towards building conservation. Favours broad admissions requirements respond to labour market's needs, and could enhance professionalism in the different roles that coalesce in building conservation. It is however a challenge for the educator.

A common approach to managing students' different backgrounds is to connect education to practice. A heterogeneous group resembles real-life situations and creates opportunities for peer-to-peer learning and training in cross-functional collaboration. Facing a real problem, students may focus on a particular function in the conservation process to advance particular skills in procurement, surveying, or transformation, for example, and also to obtain a general understanding of both conservation problems and collaboration in conservation processes. The courses may involve problem-based assignments in real conservation projects or simulated cases based on real buildings or completed projects.

An approach to meet students' varied backgrounds and changing career intentions is to apply a student-centred pedagogy. The general trend is for students to focus more on real skills than the penumbral of traditional professions. Building a curriculum like an inflexible production line puts both students and the institution at risk. A conventional student-centred approach is to provide an overview of a field and guide students in evaluating their options and considerations. With a well-prepared collaboration within the university, and with practice, students may access a relevant environment for tutoring and learning-by-doing.

Another balancing act concerns the focus of the education. The educator has to prioritize what types of courses will benefit students the most. For instance, a commission to restore a vernacular log timber house, a public 19th century masonry building or a concrete residential block from the 1960's require quite different content knowledge. To cover all materials, construction techniques and traditional crafts in a master's education is simply not possible. However, a building conservator with advanced method skills, such as methods for documentation and historical analysis, can take on different assignments and also a variety of building objects.

Another element at the core of heritage conservation is conservation approaches. The common interpretation of conservation theory is rather about the ethics of conservation practice. Ethics and policies



CONSERVATION PROCESS	CONSERVATION OBJECT	
Building conservation Performers, contractors, conservation officers, consul- tants, & developers/trustees.	The buildings Architecture, crafts, materials, construction & installations	CONTENT
Conservation approaches Preventive conservation, conservation planning, valorisa- tion & design, participatory approaches	Building investigation Documentation & visualisa- tion, historical investigation, stakeholder & functional analysis, cultural significance, diagnosis, treatment & control	METHOD
Research, ethics & management Research methods, critical heritage studies, conservation ethics, sustainability, cultural heritage management	Sciences Environment & deterioration chemistry, building physics, structural mechanisms, building as a system	EPISTEME

Figure 3. A matrix of tentative groups of course subjects which need to be balanced in a building conservation curriculum.

guide approaches, but students also need skills in how to undertake the conservation process. Complex conservation processes are situated in different contexts, and thus the professional needs a broad range of expertise in conservation approaches, such as preventive conservation, conservation planning, design-driven conservation, and integrated conservation, as well as approaches to safeguarding intangible heritage. Participatory methods in building conservation have become more and more demanded by trustees such as church congregations, non-profit foundations, and public housing associations.

A research master's degree should prepare students to be competent researchers. The master's thesis is the main element to assess the learning outcome, but there ought to be a mandatory course in the epistemology of heritage conservation. Scientific considerations in conservation could be constantly elicited. The conservation process is a science of uncertainty where the gaps of rigour and relevance have to be constantly evaluated and enacted in sustainable strategies. The professional role needs, for instance, a scholarly attitude towards the use of heritage in society, which has implications for all possible cases of building conservation. Furthermore, sustainability is a transverse aspect that needs to be considered scientifically in all kinds of assignments. On a practical level, students could be provided with opportunities to participate in real research projects, to collaborate with researchers, and to attend research seminars.

In conclusion, this article has investigated the state of the art and the future challenges for building conservation education on the master's level. In retrospect, the role of building conservators has changed and so have their knowledge and skills. The cognitive understanding of the conservation object

has also shifted—what it is, what it needs, and what it may become through conservation action. Educating professionals for the built heritage is primarily an act of intention—how to foster quality and professionalism in traditional and emerging occupations, committed to bring historic buildings, as a vital part of our cultural heritage, from their present condition and contexts into future sustainable uses.

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